FURUNO

OPERATOR'S MANUAL

SSB RADIOTELEPHONE

(Incl. Installation Instructions)

MODEL FS-5000

(For ROM version No.21 & AF board suffix no. -33)

After installation, if necessary, change system settings and adjust output power referring to pub. no. TI-E5519.

Applicable to Antenna Coupler having serial number 1001 and after

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•Your Local Agent/Dealer

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PUB. No. OME-55190
FS-5000

(YOSH)

00080214301

OME55190Y10

⚠ SAFETY INSTRUCTIONS

"**DANGER**", "**WARNING**" and "**CAUTION**" notices appear throughout this manual. It is the responsibility of the operator and installer of the equipment to read, understand and follow these notices. If you have any questions regarding these safety instructions, please contact a FURUNO agent or dealer.

⚠ DANGER	This notice indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	This notice indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or property damage.

⚠ SAFETY INFORMATION FOR THE OPERATOR

⚠ WARNING



Do not open the cover of the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death. Only qualified personnel should work inside the equipment.

Do not dissasemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Immediately turn off the power at the ship's mains switchboard if water or foreign object falls into the equipment or the equipment is emitting smoke or fire.

Continued use of the equipment can cause fire, electrical shock or serious injury.

⚠ CAUTION

Do not place liquid-filled containers on the top of the equipment.

Fire or electrical shock can result if a liquid spills into the equipment.

Do not place heater near the equipment.

Heat can melt the power cord, which can result in fire or electrical shock.

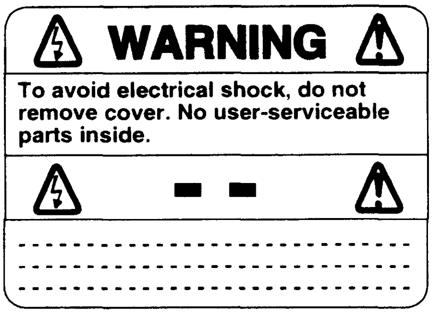
Do not operate the unit with wet hands.

Electrical shock can result.

Use the correct fuse.

Use of the wrong fuse can cause fire or equipment damage.

WARNING Label attached



Name : Warning Label (1)
Type : 86-003-1011-0
Code No. : 100-236-230

SAFETY INFORMATION FOR THE INSTALLER

⚠ WARNING



Only qualified personnel should work inside the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death.

Turn off the power at the ship's mains switchboard before beginning the installation. Post a warning sign near the switchboard to ensure that the power will not be applied while the equipment is being installed.

Serious injury or death can result if the power is not turned off, or is applied while the equipment is being installed.

⚠ CAUTION



Ground the equipment.

Ungrounded equipment can give off or receive electromagnetic interference or cause electrical shock.

Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the label at the rear of the equipment.

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SSB RADIOTELEPHONE MODEL FS-5000/8000

USER (PRESET) CHANNEL

Storing frequency		(Call up ITU or DSC CH.) [STO] (CH No.) [ENT] [ENT] ↑ 1 to 8999CH (Storage capacity: 400CH)	Class of emission & bandwidth are also stored.
Recalling freq.	TX/RX	[RCL] (CH No.) [ENT]	To see stored USER CH, press [RCL] [9] [9] [9] [8] [ENT] in that order.
	TX	[RCL] [TX] (CH No.) [ENT]	
	RX	[RCL] [RX] (CH No.) [ENT]	
Changing CH No. quickly		Move the cursor to "CH No.indication" by using the [CURS] key. Then, press [▼ TUNE ▲] key. (This operation is available for ITU/DSC CH as well.)	
Watching TX freq. on two-frequency communication	Watch	[RX] [ENT]	
	Cancel	[CANCEL]	

ITU/DSC CHANNEL

Recalling (Select class of emission prior to recalling.)	TX/RX	{[ITU] / [DSC]} (CH No.) [ENT]	**CH No.** DSC: 1 to 79CH ITU: (EX) Recalling of 401 CH 41, 401 or 4001
	RX	{[ITU] / [DSC]} [RX] (CH No.) [ENT]	

RX FREQ SETTING FROM KEYBOARD

	[RX] (Freq. in kHz) [ENT]	

REMARKS ON RX

Tuning(Preselector)	[ON] [▼PRESELECTOR▲]	Effective for freq. less than 4.5MHz.
When changing RX freq. band	[TX TUNE] (Change TX freq. band to agree with RX freq. band, then press this key.)	Only when ANT BK RELAY board is not provided in the ANT COUPLER.
Normal Setting	AGC---SLOW NB----- ON	

FREQUENCY SCANNING (AGC: ON)

Starting	(Call up ITU, DSC or USER CH) [SCAN]	**CH** / **Scan range** • DSC/USER: All CH • ITU: Within band selected. (EX) ① Standard--->"3" ② 5 sec.-------->"5"
Stopping	[SCAN]	
Changing the settings	[STO] [SCAN] ① (Set stop signal level) [ENT] ② (Set stop time) [ENT]	

FREQUENCY SWEEPING (AGC: ON)

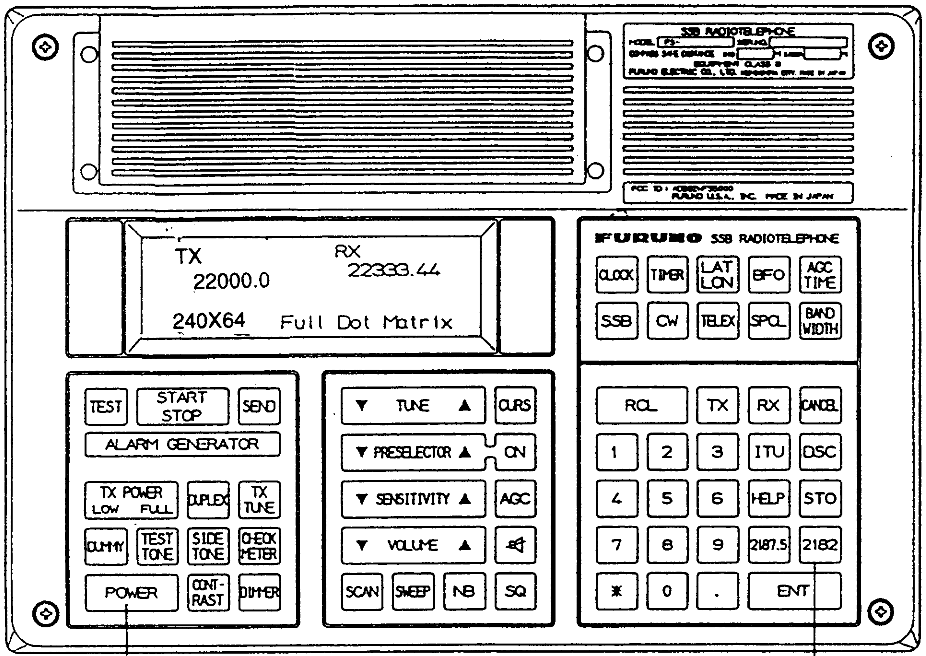
Starting	(Set RX freq.) [SWEEP]	
Stopping	[SWEEP]	
Changing the settings	[STO] [SWEEP] ① (Set sweep width freq.) [ENT] ② (Set step freq.) [ENT] ③ (Set stop signal level) [ENT] ④ (Set stop time) [ENT]	(EX) ① 10MHz--->"10000" ② 100kHz--->"100" ③ Standard-->"3" ④ 5 sec.------>"5"

TIMER

Time setting	[STO] [CLOCK] (Y.M.D.H.M) [ENT] (EX) 1990-4-8 7H5M [9] [0] [.] [4] [.] [8] [.] [7] [.] [5]
Timer	[STO] [TIMER] (D.H.M) [ENT] - - - -> Switch off after timer function is turned on ("Wake up" is displayed). (EX 1) 8H5M (daily) [8] [.] [5] (EX 2) 9th (day), 7H3M [9] [.] [7] [.] [3]

2182 kHz DISTRESS CALLING

NOTE: For installations which use an "antenna changer", connect the antenna to the Antenna Coupler before transmitting the two-tone alarm.



① Turn the power on.

② Press the **2182** key.

③ Speaking slowly and distinctly, say **MAYDAY, MAYDAY, MAYDAY.** This is ..." giving the name of vessel and call sign three times. Then continue with the distress message, as follows.

④ The name of calling vessel.

⑤ Position.

⑥ The assistance needed.

⑦ A description of vessel (type, color, number of persons aboard, etc.)

⑧ Indicate end of message by saying, Over."

DSC DISTRESS CALLING

WHEN DSC TERMINAL WITH FREQUENCY REMOTE CONTROL (e.g. Furuno DSC-6) IS EQUIPPED

1. Turn the unit on if it is not already on.

2. Press the **DISTRESS** key on the DSC terminal.

3. When a coast station acknowledges the call, the DSC terminal displays DIST-ACK and sets the predetermined DISTRESS frequency.

4. Communicate with the coast station.

WHEN DSC TERMINAL WITHOUT FREQUENCY REMOTE CONTROL IS EQUIPPED

1. Turn the unit on if it is not already on.

2. On the FS-5000, press the **2187.5** key.

3. On the DSC terminal, press the **DISTRESS** key. The DSC distress signal is transmitted over 2187.5 kHz.

4. After the DSC terminal displays DIST-ACK, press the **2182** key on the FS-5000.

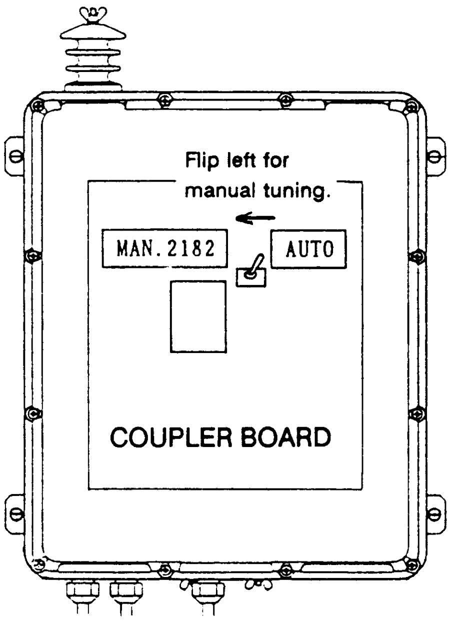
5. Communicate with the coast station.

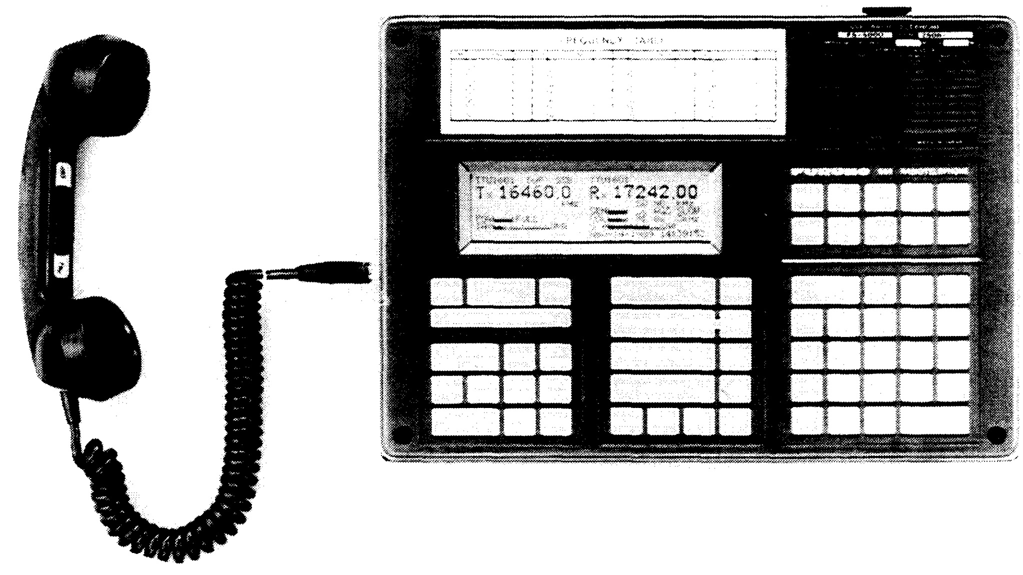
Note: For detail of distress calling using DSC, refer to the Operator's Manual for DSC terminal or one for DMC (Distress Message Control Unit).

IN THE EVENT OF ANTENNA COUPLER FAILURE

The antenna tuning circuit in the Antenna Coupler automatically tunes a wire or whip antenna. When the LCD displays "TX Tuning Error" for all frequencies, this means the coupler cannot be tuned automatically. In this case, you can communicate on 2182 kHz by tuning the coupler manually.

1. Remove the cover of the Antenna Coupler.
2. Set the **AUTO/MANUAL 2182 kHz** switch to the MAN 2182 side.
3. Replace the cover.
4. Turn the FS-5000 on and select 2182 kHz.
5. Call a coast station and tell your situation. Be sure not to transmit during silent period (00 to 03 min. 30 to 33 min. of every hour).





FS-5000 Control Unit Front View

INTRODUCTION

Furuno Electric Company thanks you for selecting the FS-5000 SSB Radiotelephone. We are confident you will discover why the Furuno name has become synonymous with quality and reliability. To get maximum performance from your unit, please carefully read and follow the recommended procedures for operation, maintenance and installation.

The FS-5000 SSB Radiotelephone is an all-purpose communications transceiver especially designed for marine mobile communication in the frequency range of 1.6 to 30 MHz. All ITU channels are preprogrammed. Where required, TX/RX frequencies can be preprogrammed into a E^2 PROM having a capacity of 400 frequency pairs.

The FS-5000 consists of a Control Unit, a fully remote controlled Transceiver Unit, an Antenna Coupler and a Handset.

The Control Unit contains all controls for transmitter and receiver operating controls. The unit itself is housed in a rugged cabinet suitable for tabletop, bulkhead or flush mounting. All operations are touchpad key-controlled by means of a keyboard. For most key operations, an audible beep is released following valid key operation. And for visual confirmation of key operation the LCD displays an indication similar to or identical to that found on the label of the key operated. The LCD also displays frequency, receive signal sensitivity, transmitter antenna current, speaker volume, and more. Its backlighting is adjustable in eight steps.

The Transceiver Unit contains all receiver and transmitter RF circuitry. All frequencies are fully synthesized and controlled by CPU.

The Antenna Coupler automatically tunes a whip or wire antenna whose length is between 7 and 18 meters. Its splashproof construction permits installation either indoors or outdoors. An internal switch permits manual tuning in the event of coupler failure.

The FS-5000 operates from a 24 or 32 VDC power supply. For operation from 100/110/120/200/220/240 VAC power supply, a Rectifier Unit is required.

- GMDSS operation: DSC and NBDP connections
- **2182** key provides for immediate selection of 2182 kHz (at FULL power automatically)
- Full duplex operation possible, Scan/Sweep receiving function, Timer operation
- PROM stores all ITU SSB/TELEX/CW frequencies
- Optional dummy load (in the Antenna Coupler) permits checking of transmitter
- Inputs for CIF/NMEA data, to display ship's L/L position on the LCD
- Effective noise blanker cancels pulse noise
- Advanced "voice" detect type squelch circuit filters out unwanted noise
- Additional control unit (priority setting available)
- Remote station (RB-500) connectable

- Meets the following standards and regulations:
  IMO A. 694(17)
  IMO A. 806(19)
  IMO A. 813(19)
  IMO MSC 68(68)
  ETS 300 373+A1
  IEC 60945

Program number

U3 : 05501541-05

U9 : 05501311-23

U10 : 05501311-23

SPECIFICATIONS OF FS-5000

GENERAL

1) Communication System	Full duplex, semi-duplex or simplex (duplex operation requires receiving antenna)
2) Class of Emission	J3E, (USB, LSB), H3E, R3E, A1A, F1B (J2B), J3C
3) Frequency Range	1.6 MHz to 30 MHz
4) Number of Channels	Preset (User): 400 TX/RX pairs All ITU channels incorporated (Incl. DSC channels)
5) Frequency Accuracy	± 10Hz (-20°C to +50°C)
6) Ambient Temperature Range	-20°C to 55°C
7) Power Supply	24/32 VDC +30%, -10% Consumption at 24 VDC Receive --------------------- 3A Transmit (SSB) ---- Peak 60A 100/110/120/200/220/240 VAC, 1ø, 50/60 Hz, 2.4 kVA Max. (by Rectifier Unit PR-850, optional supply)
8) Coating Color	Control Unit front panel: Munsell N-3.0 Transceiver Unit: 2.5GY5/1.5 Antenna Coupler: White

TRANSMITTER

1) Frequency Range	1.6065 MHz to 29.9999 MHz (100 Hz steps)
2) RF Output Power	400 W pep +0/-1.4 dB (1.6 - 25.5 MHz) at 50 ohm load (@ 24 VDC, IEC rec.)
3) Modulation AF Response	350 Hz to 2700 Hz
4) Keying Speed	CW: 25 bauds TELEX: 100 bauds
5) AF Input	-46 dBm/600 ohms
6) Tone Frequency	1500 Hz

RECEIVER

1) Receiving System — Double conversion superheterodyne
IF: 45455 kHz and 455 kHz

2) Frequency Range — 10 kHz to 29.9999 MHz
(10 Hz steps)

3) Sensitivity — Input level at 50 ohms to produce
SINAD 20 dB

Frequency Range	SSB	AM
100 kHz to 300 kHz	25 dBuV	39 dBuV
300 kHz to 1.6 MHz	15 dBuV	29 dBuV
1.6 MHz to 30 MHz	3 dBuV	17 dBuV

4) Intermodulation — 90 dBμV (CEPT method test)

5) Cross Modulation — 94 dBμV (CEPT method test)

6) Selectivity

J3E/R3E:	350 to 2700 Hz
H3E:	±3 kHz
A1A/F1B:	±150 Hz

7) AF Output Power

Internal speaker:	2 W/8 ohms
External speaker:	4 W/4 ohms
Handset:	10 mW/200 ohms

8) Standard Features — Scan, Sweep, Noise Blanker, Voice-activated Squelch, Preselector (for MF)

ANTENNA COUPLER

1) Tuning System	CPU controlled manual tuning possible for 2182 kHz
2) Frequency Range	1.6 MHz to 30 MHz
3) Input Impedance	50 ohms
4) Required Antenna	7 to 18 meter wire and/or whip
5) Tuning Power	10 W
6) VSWR	1.5 max.
7) Tuning Speed	0.2 to 2 sec. typical. 15 sec. max.
8) SOLAS Dummy Load	Internal (10 ohms +250 pF, 200W average), optional supply
9) Antenna BK Relay	Internal, optional supply
10) Ambient Temperature Range	-30°C to +70°C
11) Relative Humidity	95% @ 35°C

MISCELLANEOUS FUNCTIONS

1) Ship's L/L Position display (inputs for CIF/NMEA format sentences)
2) Timer
3) Digital Selective Calling (DSC) & Narrow Band Direct Printing (NBDP) possible
4) Intership FAX connection possible
5) Remote Station (RB-500) connection possible

COMPASS SAFE DISTANCE

	Standard (m)	Steering (m)
Control Unit	0.9	0.7
Transceiver Unit	2.0	1.5
Antenna Coupler	1.0	0.7
Rectifier Unit	1.5	1.2

PRECAUTIONS

- Before operating the equipment, a proper license and call sign must be released for the radio station. The operator of the equipment must be familiar with the rules of radio communication before operating the equipment.
- This equipment can be operated only by a person holding a valid radio operator license or permit.
- Although the FS-5000 can transmit any frequency between 1.6 MHz to 30 MHz, the station licensee is always responsible for the lawful and proper operation of his station. FURUNO will assume no responsibility for any communication disturbance or inconvenience due to illegal transmission on an unauthorized frequency range.
- The radio wave is public property. Do not transmit with too much power or when unnecessary.
- It is unlawful to divulge what is overheard by radio or wire.
- Because heat dissipates through the cabinet of the Transceiver unit, secure enough space on all sides of the cabinet to permit circulation of cooling air. **NEVER** put anything on the top of the unit.
- The battery (power supply) must be fully charged so the transmitter can supply ample power to the antenna.
- The Antenna Coupler tunes the radio to the antenna when the PTT switch on the handset is pressed. Should the Antenna Coupler malfunction, the LCD displays TX Tuning Error. In this case, you can communicate on 2182 kHz by operating the Antenna Coupler manually. Open the cover of the Antenna Coupler, set the AUTO/MANUAL 2182 kHz switch to MAN 2182, and then press the **2182** key. Begin your call at any time other than silent time (0 to 3, 15 to 18, 30 to 33, 45 to 48 minutes of every hour). Before transmission, confirm that no distress message is received on 2182 kHz.

SYSTEM CONFIGURATION

The FS-5000 SSB Radiotelephone consists of a Control Unit, a Transceiver Unit, an Antenna Coupler and a Handset. Optionally available equipment includes a whip or wire antenna kit, Rectifier, telegraphy key, external speaker, headphone and two types of microphones.

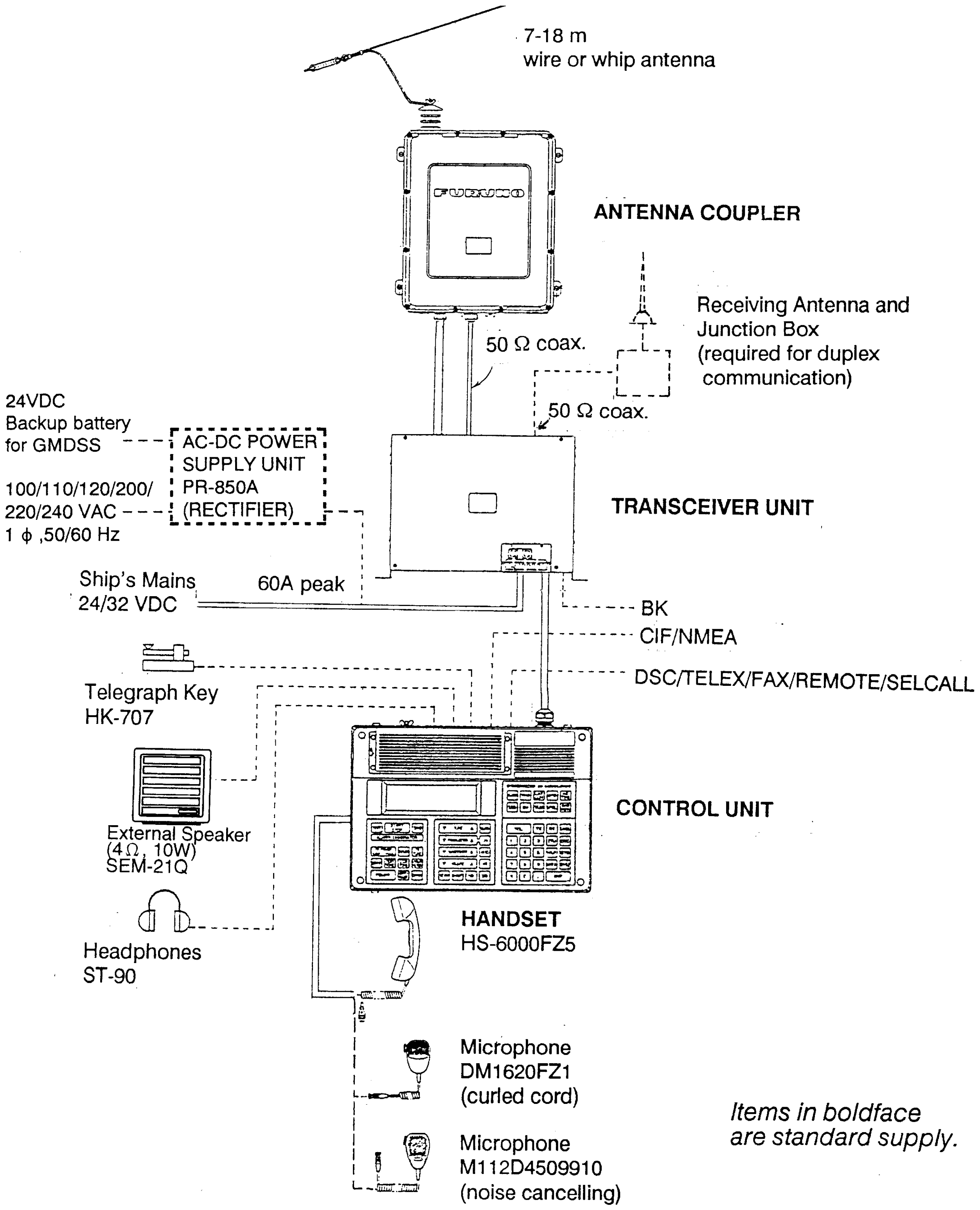


Fig. i System Configuration

1. OPERATION

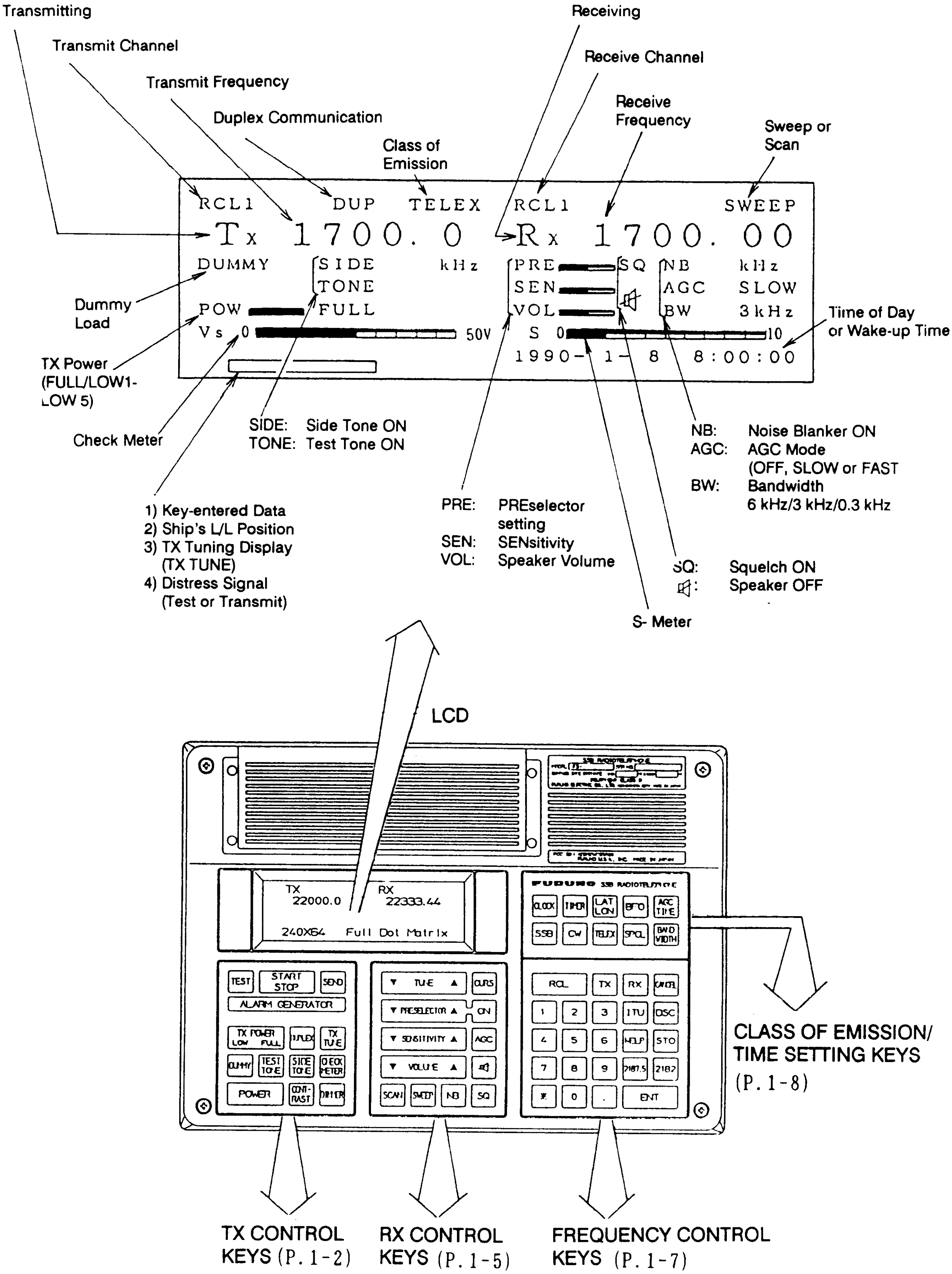


Fig. 1-1 Front Panel Controls & Indications

CONTROLS

The FS-5000 is operated from the Control Unit, and is completely keyboard controlled.

The simple and logical layout of the keyboard makes the FS-5000 easy and intuitive to use. The keyboard consists of 58 keys arranged in four blocks (TX, RX, frequency selection, and class of emission and time setting) according to function.

The LCD shows receive and transmit frequencies, transmitter output power, time of day, receiver signal strength, class of emission, etc.

When the transmitter is turned on, time of day is displayed from a built-in real time clock, which can also be used to turn on the equipment at a predetermined time.

When the unit is turned off, the real-time clock and the memory are supplied from a built-in Nicd battery. The non-volatile memory also stores the current settings of the equipment and restores them when turning the power on again.

TX Block Keys

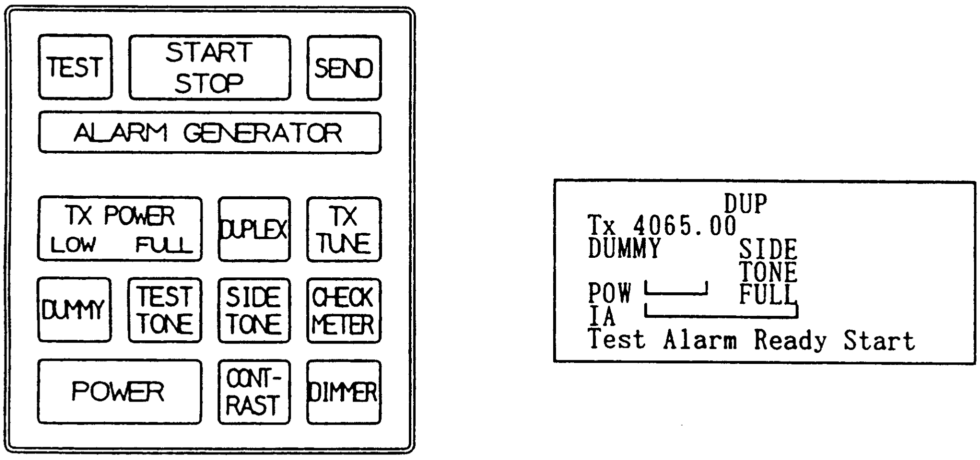


Fig. 1-2 TX Block Keys and Associated Indications

Key	Function	Indication on LCD
POWER	Turns the power on and off. To turn the power on or off, press and hold down the key for more than one second.	
CONTRAST	Adjusts the backlighting for the LCD in eight steps.	
DIMMER	Adjusts the illumination for the keyboard in eight steps.	

Key	Function	Indication on LCD
TEST	Tests the two-tone signal generator for proper operation. To stop testing, press the key again.	Ready to test Alarm
SEND	Enables transmission of the two-tone signal. To transmit the two-tone signal, press the **SEND** key followed by the **START/STOP** key. To stop transmission, press the **START/STOP** key again.	Ready to send Alarm
START/STOP	Starts and stops transmission of the two-tone alarm. Released two-tone signal will stop automatically in about 45 sec.	Start Stop
TX POWER LOW/FULL	Adjusts transmitter output power....(*8) max. output power .... **FULL** low output power.................. **LOW** Each press of the **LOW** key changes low output power in the sequence of LOW1, LOW2 ... Display — TX Power FULL — 400 W approx. LOW1 — 250 W approx. LOW2 — 140 W approx.	FULL LOW1 ~
DUPLEX	Turns duplex communication on and off. (Duplex communication requires the use of a receiving antenna.) DUPLEX SP ON ⟶ OFF } Automatic OFF ⟶ ON } Change	DUP
TX TUNE	Tunes the radio to the antenna. Tuning takes from 0.2 to 15 seconds. Tuning is also made when the PTT switch is pressed....(*1)	TX TUNING OK appears after tuning is completed.
DUMMY	Turns the dummy load on and off. (This key functions only when the optional dummy load is installed in the Antenna Coupler. Refer to page 1-17.)...(*2) *Dummy is automatically disconnected when SEND and START keys are pressed in this order. For the procedure for dummy test on 2182 kHz, refer to page 1-19.)	DUMMY
TONE	Turns the test tone on and off. Tone frequency may be changed. For further details, see page 1-16. (*3)	TONE

Key	Function	Indication on LCD
SIDE TONE	Turns the side tone on and off. Side tone frequency may be changed. For specifics, see page 1-16. (*3)	SIDE
CHECK METER (*4)	Selects check meter display. Meter Swing <u>(J3E max.output)</u> Ia: antenna current .... (*5) Po: TX output power...... 90-100% (*6) Pi: input power.............. about 900 W Ic: collector current....... about 21 Vc: collector voltage....... about 43 Vs: supply voltage.......... about 23 AL: ALC level.................. 10 Th: final stage temperature (*7)	 IA (10A) Po (100%) Pi (1 kW) Ic (50A) Vc (100V) Vs (50V) AL (10) Th (100°C)

(*1) When tuning is terminated, beep is released.

	For tuning OK	For tuning error
Audible Beep	One	Three
LCD Display	TX Tuning OK	TX Tuning Error

(*2) If the TX frequency is changed with the dummy load on, the dummy load is automatically turned off. When you press the PTT switch after turning on or off the [DUMMY] key, tuning is automatically done.

(*3) Tone volume may be set independently of speaker volume.

(*4) Analog value can be displayed concurrently with the bar display. For further details, see page 1-17.

(*5) Antenna current is subject to frequency. Generally, the meter swings greatly on MF (medium frequencies) and swings slightly on HF (high frequencies).

(*6) Output power appears in percentage.

(*7) Cooling fans turn on when the temperature at the final stage exceeds 55°C. Output power is reduced automatically when temperature is 90°C.

(*8) Power can not be reduced on both 2182kHz and 2187.5kHz. (Changeable depending on regulations)

RX Block Keys

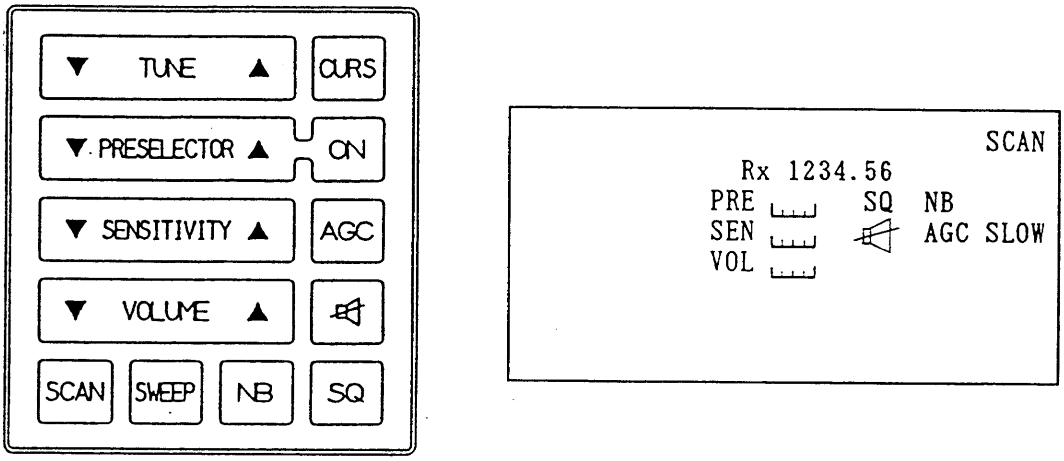


Fig. 1-3 RX Block Keys and Associated Indications

Key	Function	Indication on LCD
TUNE	Coarsely tunes RX frequency. To tune, press the **CURS** followed by the **TUNE** key.	
CURS	Positions the cursor to affect change of frequency.	
PRESELEC-TOR (*1)	Tunes the receiver and the antenna (for frequencies below 4.5 MHz). To tune, press the **ON/OFF** key followed by the **PRESELECTOR** key.	
ON/OFF	Turns PRESELECTOR (RX tuning) on and off.	PRE
SENSITIVITY	Adjusts receive signal sensitivity.	SEN
VOLUME	Adjusts speaker volume.	VOL
AGC	Turns AGC on and off.	AGC OFF SLOW or FAST
🔇	Turns the speaker on and off.	🔇 (SP OFF)
SCAN (*2)	Starts and stops frequency scanning. (The receiver scans receiving channels in ascending order beginning with current frequency.)	SCAN
SWEEP (*2)	Starts and stops frequency sweeping. (The receiver, using current frequency as center frequency, sweeps a frequency band according to preset frequency width.)	SWEEP
NB	Turns the noise blanker circuit on and off.	NB (*5)
SQ (*3)	Turns the squelch circuit on and off.	SQ (*5)

(*1) Adjust for maximum sensitivity. The setting position is displayed by bar graph and appears to the right of the indication PRE.

Once the preselector is set, the setting position is memorized until the setting is changed. (The resolution of data storing for the frequency lower than 1 MHz is 50 kHz and for frequency range between 1 and 4.5 MHz, 100 kHz.)

In scan/sweep reception mode, the preselector setting is disregarded when frequencies above 4.5 MHz are received and becomes effective when frequencies lower than 4.5 MHz are received. However note that you should adjust the preselector before starting reception.

Note: *The preselector turns off automatically when the frequency is changed from MF to HF. ("PRE" indication remains.) When the frequency is restored to MF, the preselector turns on automatically. "PRE ⊔⊔⊔⊔" is displayed.)*

(*2) To perform scanning and sweeping, turn the AGC on.

Parameters for sweeping and scanning (signal strength, stop time, sweep width, step intervals, etc.) are operator-adjustable. For further details, see pages 1-14 and 1-15.

(*3) The squelch circuit functions to quiet the receiver in the absence of a receive signal. When the squelch is on, the receiver filters out noise in high frequency components (noise), outputting only low frequency components (voice signal).

(*4) When setting the TUNE, PRESELECTOR, SENSITIVITY and VOLUME, beep is not released to enable the receiving sound to be heard.

(*5) To select class of emission TELEX turn off the noise blanker and the squelch circuits.

Frequency Control Block Keys

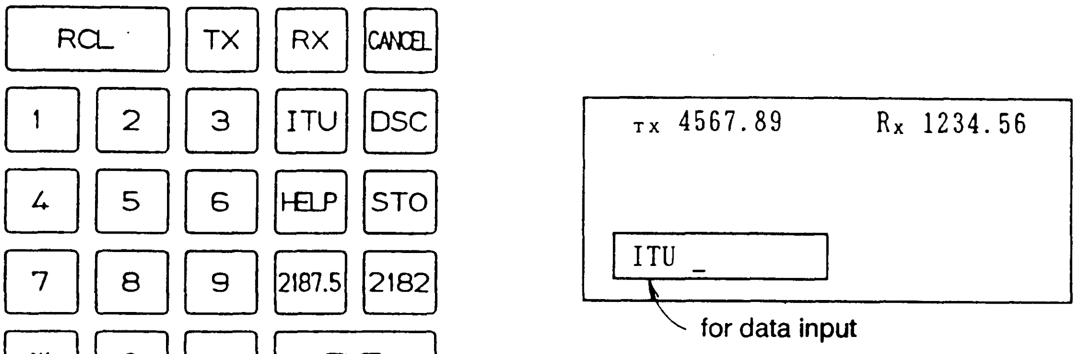


Fig. 1-4 Frequency Control Block Keys and Associated Indications

Key	Function
RCL	Recalls user predetermined channels. (*1)
TX **RX**	Selects TX frequency. Selects RX frequency.
CANCEL	Cancels wrong data.
Numeral & Decimal Keys	Ten keys for entering frequency.
ITU **DSC**	Recalls ITU frequency. Recalls DSC frequency.
HELP	Gives information about a key's function. To get operating information, press a key followed by the **HELP** key. To escape from a help screen, press the **HELP** key again.
STO	Registers user frequencies (see page 1-12) and changes factory-set parameters (see page 1-17).
2182 & **2187.5**	Changes receiver and transmitter frequency to 2182 kHz (distress frequency.) ----- Output power: "FULL" (max.) --- (*2) Changes receiver and transmitter frequency to 2187.5 kHz (DSC frequency.) ----- Output power: "FULL" (max.) --- (*2)
ENT	Terminates keyboard operation.
*	Turns key lock function on and off, and calls remote station (Intercom). See page 1-17.

(*1) User channels are operator-set channels numbered 1-8999 (max. 400 channels).

(*2) When you press one of these keys, if the setting of the sensitivity is less than "7", the settings of AGC and sensitivity are automatically changed to "ON" and "maximum", respectively.

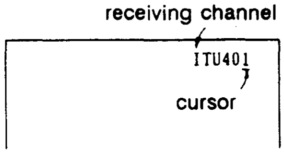
CHANNEL CHANGE BY CURS & TUNE KEYS

The **CURS** & **TUNE** keys permit manual change of channel. To change a memory-stored ITU channel, for example;

Example: Change ITU channel from 401 (key press: **ITU, 4, 0, 1, ENT**) to 405

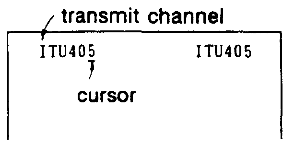
(1) Change only receiving channel

Operate the **CURS** key to place the cursor on the last digit of the RX channel; and then press the **TUNE** key to change the RX channel.

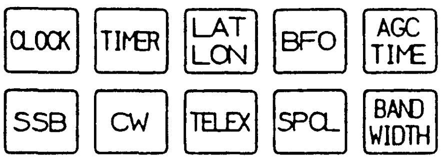


(2) Simultaneous change of TX and RX channel

Operate the **CURS** key to place the cursor on the last digit of the TX channel; and then press the **TUNE** key to change both the RX and TX channels.



Class of Emission/Time Setting Block Keys



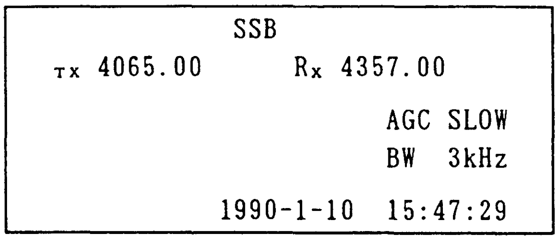


Fig. 1-5 Class of Emission/Time Setting Block Keys and Associated Indications

Key	Function	Indication on LCD
SSB CW TELEX SPCL	Selects SSB. Selects CW. Selects TELEX. Selects class of emission in order of AM, R3E, FAX and LSB each time it is pressed. (FAX is for weather reports; for intership FAX messages, use SSB.)	
BFO	Selects BFO frequency. (Effective only in CW, TELEX and FAX.) The operator may change the BFO frequencies. --- (*4)	
AGC TIME (*1)	Selects AGC curve: FAST or SLOW.	AGC SLOW AGC FAST
BANDWIDTH (*2)	Selects receiver bandwidth. Each time the key is pressed the bandwidth changes in the sequence of 6 kHz, 3 kHz and 0.3 kHz.	BW 6 kHz 3 kHz 0.3 kHz
CLOCK (*3)	Turns the time of day display on and off.	Displayed on bottom-right hand side. Display priority: (LAT LON...Highest CLOCK...Lowest)
TIMER (*3)	Turns the wake-up timer on and off.	
LAT LON	Turns the ship's L/L position display on and off. (Key does not function without CIF/NMEA data input.)	

(*1) Recommended AGC Curve

Condition	Setting
SSB, TELEX, Telegraphy	SLOW
High levels of pulse noise or for duplex communication	FAST
Noise on long-distance communication	OFF

To select class of emission TELEX set AGC curve FAST. For other class of emissions, set AGC curve SLOW.

(*2) Standard Bandwidth for Each Class of Emission

Class of Emission	* Bandwidth
SSB/LSB/R3E/FAX	3 kHz
AM	6 kHz
TELEX/CW	0.3 kHz

*changeable

(*3) Refer to page 1-10 for date and timer settings.

(*4) The AF output frequency (center freq.) of the radiotelephone for combined equipment is also changed. For example, if the DSC-6(DP-6) is combined, the BFO frequency should be set to <u>1700Hz.</u>

BASIC OPERATION

Turning the Power On And Off

To turn the power on or off, press and hold down the **POWER** key for more than one second. *The power cannot be applied when the power supply voltage is out of its rating.*

Adjusting LCD Contrast & Keyboard Illumination

The **CONTRAST** key adjusts LCD contrast, and the **DIMMER** key keyboard illumination.

Setting Date & Time

The internal real-time clock shows the date and time of day. To set the clock, press the **STO** key followed by the **CLOCK** key. Enter date and time followed by the **ENT** key.

Example: January 10, 1990, 9 hr. 32 min.

9 0 [.] 1 [.] 1 0 [.] 9 [.] 3 2 ENT
(press the ENT key in synchronization with a time signal)

The current date and time of day appear at the bottom right-hand corner of the LCD. *When the wake-up timer is turned on, the date and time of day display disappears, and vice versa.*

Setting the Wake-up Timer

The internal wake-up timer turns on the set at a predetermined time. The wake-up time can be a specific day and time, daily or hourly. To set the wake-up timer, press the **STO** key followed by the **TIMER** key. Enter the wake-up time desired followed by the **ENT** key. Use 24-hour notation to enter time. *The wake-up time appears at the bottom right-hand corner of the LCD.*

Specific Date & Time

To have the set turn on at 6:05 on the 11th day of the current month, for example, press;

1 1 [.] 6 [.] 5 ENT

Daily

To have the set turn on daily at 8:30, for example, press **8**, **[.]**, **3** and **ENT**.

Hourly

To have the set turn on hourly on the 6th minute, for example, press **6**, and **ENT**.

Class of Emission Selection

To select class of emissions SSB, CW or TELEX, press the corresponding key. For other class of emissions, use the **SPCL** key. Each time the key is pressed the class of emission changes in the following sequence.

→ AM → R3E → FAX (weather fax) → LSB → (back to AM)

Frequency Selection

Conventions

- Entered data appears at the lower left-hand side of the LCD.
- The **ENT** key functions to terminate keyboard operation. When the key is pressed, the LCD displays OK to confirm that the unit has received the operator's command. For invalid key operation, the unit releases three audible beeps and clears the LCD.
- The **CANCEL** key cancels wrongly entered data.

Function		Keying Sequence	Remarks
Direct Frequency Input	TX (*1)	**TX** **frequency** **ENT**	**TX Freq. Range:** **1606.5 kHz to 29999.9 kHz**
	RX	**RX** **frequency** **ENT**	**RX Freq. Range:** **10 kHz to 29999.99 kHz**
	TX/RX (*1) (*2)	**TX** **RX** **frequency** **ENT**	
ITU Channel	TX (*1) (*2)	**TX** **ITU** channel no. **ENT**	Select class of emission beforehand. ITU channel may be entered as 41, 401 or 4001.
	RX (*2)	**RX** **ITU** channel no. **ENT**	
	TX/RX (*1)	**ITU** channel no. **ENT**	
User Channel	TX (*2)	**TX** **RCL** channel no. **ENT**	User channel must be stored in the memory.
	RX (*2)	**RX** **RCL** channel no. **ENT**	
	TX/RX	**RCL** channel no. **ENT**	

Function		Keying Sequence	Remarks
Copy RX freq. to TX freq. (Watch of TX freq. on duplex channel)		**RX** **ENT** **ENT** (*3)	
Copy TX freq to RX freq. (*1)		**TX** **ENT** **ENT** (*3)	
Alternate selection of TX and RX frequencies. (*1) (*2)		**TX** **RX** **ENT** **ENT** (*3)	Exchange between TX and RX freq.
Immediate selection of 2182, 2187.5	2182	**2182**	
	2187.5	**2187.5**	
DSC calling	TX (*1) (*2)	**TX** **DSC** channel no. **ENT**	Range of channel numbers is 1 to 79.
	RX (*2)	**RX** **DSC** channel no. **ENT**	
	TX/RX(*1)	**DSC** channel no. **ENT**	
Storing/clearing user channels (*4)	Storing (*1)	(*) **STO** channel no. **ENT** **ENT** (*3) (*): Determine TX or RX frequency, class of emission and bandwidth before hitting the **STO** key.	channel setting range is 1-8999, max. 400 channels.
	Clearing (*1)	**STO** channel no. **ENT** **0** **ENT**	

(*1) Capability depending on regulations.

(*2) Sequence of operation for selecting TX or RX and channel may be reversed. For example: **TX, ITU** or **ITU, TX**.

(*3) The **ENT** key must be pressed twice to affect a reaction. When you desire to cancel this function, press the **CANCEL** key after pressing the **ENT** key once.

(*4) To clear all user channels, change specification 9997. Refer to page 1-17.

Viewing the Contents of User CH.

To view the contents of user channel, press;

Keys	Channel No.	TX Freq.	RX Freq.	Class of Emission	Bandwidth	TX Power
RCL **9** **9** **9** **8** **ENT**	1	Txxx ...	Rxxx ...	AM	W	255-25
ENT	2	Txxx ...	Rxxx ...	SSB	M	250-20
ENT	4	Txxx ...	Rxxx ...	CW	N	250-20

To escape, press any key.

RECEIVING

Function	Keying Sequence	Remarks
Fine tuning	**CURS** **TUNE**	Place the cursor on the digit (1 kHz, 100 Hz, 10 Hz places) to be changed and then press the **TUNE** key. In AM, 1 k, 10 k and 100 kHz places can be changed.
Tune receive signal. (preselector on/off)	**ON OFF** **PRESELECTOR**	Effective for frequencies below 4.5 MHz.
Adjust receive sensitivity.	**SENSITIVITY**	Adjust so that signal is picked up.
Adjust speaker volume.	**VOLUME**	
Adjust AGC. ON/OFF	**AGC**	
Adjust AGC. Curve	**AGC TIME** (FAST/SLOW)	
Select bandwidth.	**BANDWIDTH** (6 kHz/3 kHz/0.3 kHz)	
Select BFO frequency.	**BFO** frequency **ENT**	For CW, TELEX and FAX only.
Turn the squelch circuit on or off.	**SQ**	
Turn the noise blanker circuit on or off.	**NB**	When the radio is just turned on, or frequency is just changed, it may take a few seconds to make the NB effective.
Turn the speaker on or off.	appears when the speaker is off.	
Reading signal strength		The S-meter displays receive signal strength when the AGC is on.

S meter indication

The S meter bar graph indicates the strength of received signal with AGC turned on. It is used for settings of "Scan/Sweep stop signal level". First, adjust the SENSITIVITY key so that white noise is slightly heard, and then read the value of the S meter bar graph. (This value is used for "Scan/Sweep stop signal level settings". Refer to page 1-14.)

Note: When the receiving band is changed (with 50 ohm BK relay used), tune the antenna coupler by selecting a TX frequency in the same band and pressing the **TX TUNE** *key.*

SCAN RECEIVING (AGC on)

Function	Keying Sequence/Remarks
Select memory-stored channel.	For DSC and user channels, the receiver scans all channels. For ITU channels, the receiver scans the channels in the band selected by the operator. Example: user channel 5 **RCL 5 ENT**............................ RCL5 RCL5
To begin scanning.	**SCAN** (The receiver scans memory stored TX/RX frequency pairs according to predetermined parameters. Note that some authorities prohibit scan receiving.)
To stop scanning.	**SCAN**

Setting Scan Parameters

Example
Stop S Level: 5
Stop Time: 2 sec

1. Press the **STO** key followed by the **SCAN** key. The scan stop signal level setting screen appears.

   `SCAN stop S level [3,0-10]_`

2. Enter a value among 0-10 seconds followed by the **ENT** key. The scan stop time setting screen appears.

   `SCAN stop S level [3,0-10] 5`

   S meter indication "0"~"10"
   (Ref. to page 1-13.)

3. Enter a scan stop time followed by the **ENT** key.

   `SCAN stop time [1 sec]_`

   `SCAN stop time [1 sec] 2`

   Integral number

Viewing Scan Parameters

To view scan parameters, press **STO**, **SCAN** and **ENT** keys in that order.

SWEEP RECEIVING (AGC on)

Function	Keying Sequence/Remarks
Set center frequency for sweep receiving.	Example: 4350 kHz **RX 4 3 5 0 ENT**
To start sweeping.	**SWEEP** (The receiver sweeps frequencies according to predetermined parameters.)
To stop sweeping.	**SWEEP**

Setting Sweep Parameters

Example
Sweep Width: 25 kHz, Step Freq.: 1.5 kHz,
Stop S Level: 5, Stop Time: 2 sec

1. Press the **STO** key followed by the **SWEEP** key. The sweep width frequency setting screen appears. Enter a value among 10 to 29999.99 kHz followed by the **ENT** key. The sweep step frequency setting screen appears.

```
SWEEP width [100.00kHz] _
```

```
SWEEP width [100.00kHz] 25
```
"10"~"29999.99"

2. Enter the sweep step frequency desired among 0.01 to 29999.99 kHz followed by the **ENT** key. The sweep stop level setting screen appears.

```
SWEEP step freq. [10.00kHz] _
```

```
SWEEP step freq.[10.00kHz] 1.5
```
"0.01"~"29999.99"

3. Enter a sweep stop level among 0 to 10 followed by the **ENT** key. The sweep stop time setting screen appears.

```
SWEEP stop S level [3,0-10] _
```

```
SWEEP stop S level [3,0-10] 5
```
S meter indication "0"~"10"
(Ref. to page 1-13.)

4. Enter a sweep stop time followed by the **ENT** key.

```
SWEEP stop time [1 sec] _
```

```
SWEEP stop time [1 sec] 2
```
Integral number

Viewing Sweep Parameters

To view sweep parameters, press the **STO**, **SWEEP** and **ENT** keys in that order.

TRANSMITTING

Function	Keying Sequence	Remarks
Adjust transmitter output power.	max. output power...**FULL** (FULL) low output power.....**LOW** (LOW1, etc.)	
Duplex communica-tion	**DUPLEX**	Receiving antenna required. To reduce transmission noise, AGC time and NB should be set at "FAST" and "ON", respectively.
To test transmitter by dummy load.	**DUMMY**	Dummy load required (in antenna coupler). Refer to page 1-17. For two-tone test using dummy load, refer to page 1-19.
Tuning to antenna.	**TX TUNE** (whenever the key is pressed, tuning starts)	Initial press of PTT switch after selecting frequency also starts tuning.

During transmission, the FS-5000 monitors final stage temperature, final stage transistor collector current and antenna matching. If any abnormality is detected, output power is reduced automatically and "LOW1" may be displayed on the LCD display.

CHANGING FACTORY-SET TONES

The frequency of the test tone, side tone and BFO frequency may be changed depending on operator's requirements.

Test Tone Frequency

Press the **STO** and **TONE** keys, key in frequency desired and then press the **ENT** key. The factory setting is 1500 Hz.

Side Tone Frequency

Press the **STO** and **SIDE TONE** keys, key in frequency desired and then press the **ENT** key. The factory setting is 800 Hz.

BFO Frequency

Press the **BFO** key, key in frequency desired and then press the **ENT** key. The factory settings are CW, 800 Hz; TELEX, 1700 Hz, and FAX, 1900 Hz.

CHANGE OF SPECIFICATIONS

Several specifications may be changed depending on requirements. To change a specification, press the **STO** key, enter item number (referring to the table below; factory settings are highlighted) and setting number desired, and press the **ENT** key.

Table 1-1 Operator-changeable Specifications

No.	Specification		Setting Number			
			0	1	2	3
9907	Time System (*1)		Japan	USA	Europe	–
9908	Second Unit display		YES	NO	–	–
9909	Expression for Class of Emission		NORM (SSB)	ITU (J3E)	–	–
9910	Check meter numeral display		NO	YES	–	–
9915	Check meter items		FULL	SHORT (*2)	–	–
9916	Key lock (controlled by * key)		OFF	ON (*3)	Intercom: ON (*4)	–
9918	Time adjustment (clock)		Auto	Man	–	–
9919	Control unit priority (*5)		No	#1	#2	–
9920	Key response (beep)	ON/OFF	OFF	ON	–	–
9921		Volume	(0-10, factory setting: 6)			
9922		Freq.	(100 Hz-3000 Hz, factory setting: 2000 Hz)			
9923	Dummy (*6)		Enable	Disable	Not used	–
9940	Receiver bandwidth	SSB	6 k	3 k	0.3 k	–
9941		CW	6 k	3 k	0.3 k	–
9942		TELEX	6 k	3 k	0.3 k	–
9943		AM	6 k	3 k	0.3 k	–
9944		R3E	6 k	3 k	0.3 k	–
9945		FAX	6 k	3 k	0.3 k	–
9946		LSB	6 k	3 k	0.3 k	–
9951	RX antenna in telex mode (only when R ANT SEL PCB is installed)		Not used	Used	–	–
9952	Tx antenna status at reception --- (*7)		OFF (No change)	ON (To GND) --- *7	–	–
9997	Clear all user channels		–	ON	–	–

(*1) Factory setting depends on country of delivery.

(*2) If you select "1" (Short), only check data for Ia, Vc, Ic and Pi are displayed (repeatedly) every pressing of the **CHECK METER** key.

(*3) To lock the keyboard (except for **SEND, START, 2182,** and **2187.5**), select "1" (ON). Then press the * key to turn on the key lock function. First press of the * key make the keys inactive. ("Keyboard Lock [ON]" appears on the display.)

(*4) Operation of Intercom

- Calling: [*]→(Remote Station Terminal No.)→[ENT], then communicate.
- Ending communications: [CANCEL]
- Answering: [ENT], then communicate.

(*5) For Control Unit priority setting, both Control Units must share the same setting number;

No. 1 Control Unit priority

Control Unit	Setting No.
No. 1	"1"
No. 2	"1"

No. 2 Control Unit priority

Control Unit	Setting No.
No. 1	"2"
No. 2	"2"

(*6)

Setting	Function	LCD Indication	Remarks
"0" (ON/OFF)	Dummy load ON/OFF by **DUMMY** key	DUMMY	DUMMY LOAD board required
"1" (prohibited)	**DUMMY** key inactive	none	no DUMMY LOAD board

(*7) This function is available only when Rx antenna is installed. Dummy load board with ANTENNA EARTH RELAY is required. If "ON" is selected, Tx (main) antenna is connected to ground at reception.

If you want to connect Tx antenna to ground manually (irrespective of 9952 setting), press [DUMMY] key.

TESTING THE TRANSMITTER BY DUMMY ANTENNA (OPTIONAL SUPPLY)

1. Press the **DUMMY** key.

2. Select a frequency near 2182 kHz.

3. Select SSB.

4. Communicate with the handset, confirming that antenna current (Ia) flows with voice level.

Testing the Transmitter by Dummy Antenna and Two-tone Alarm Signal (required by SOLAS)

Method 1

1. Press **STO, 9, 9, 1, 1, ENT, 1, ENT** key in that order.
2. Press **STO, 9, 9, 1, 2, ENT** key.
   2191 kHz will be displayed (if necessary, this frequency can be changed; but do not select 2182 kHz.)
3. If the frequency is OK, press **ENT** key.
4. Press **TEST** and then **START** key. The dummy antenna is connected automatically and the two-tone alarm signal is emitted.

After completion of the test, restore the system setting of 9911 to the default setting.

Method 2

1. Set the frequency other than 2182kHz.
2. Set the class of emission to "AM".
3. Press **DUMMY, TEST, START** in this order. Then transmit by pressing the PTT switch.

2. MAINTENANCE

GENERAL

The FS-5000 provides years of trouble-free operation provided it is properly installed and maintained. To ensure continued performance, follow the recommended procedures for maintenance.

⚠WARNING



Do not open the cover of the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death. Only qualified personnel should work inside the equipment.

Do not dissasemble or modify the equipment.

Fire, electrical shock or serious injury can result.

Power Supply Periodically confirm that the power supply is operating within in its rating (24/32 VDC, +30%, -10%).

Handset The handset is sensitive to heat, moisture and shock. Handle it carefully.

Coils & Potentiometers Unnecessary adjustment of coils and/or potentiometers may permanently damage the equipment.

Memory If the power is off more than a month, time data and wake-up timer settings will be erased. To reenter date and time, press the **STO** and **CLOCK** keys to call up the time setting screen. To reset the wake-up timer, press the **STO** and **TIMER** keys to call up the wake-up timer setting screen.

Cleaning

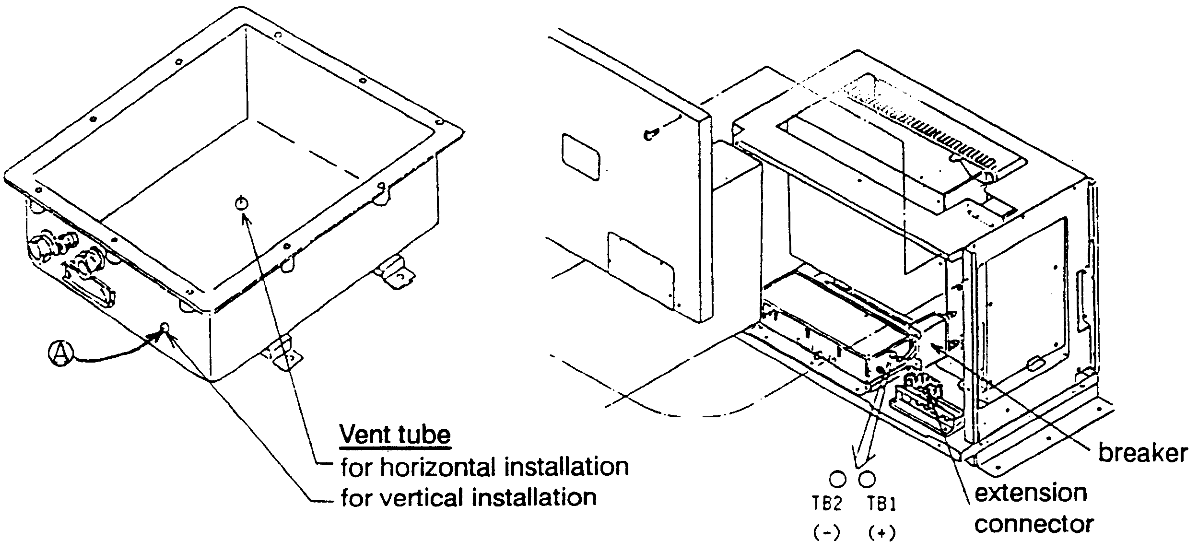
Accumulated dust on units may be removed with a soft cloth. For stubborn dirt use water and mild soap. **NEVER USE SOLVENTS FOR CLEANING**, since they may remove paint and markings.

Regular Maintenance

A quarterly maintenance program should be established and should include at least the following:

Table 2-1 Checks to be Performed Every 3 Months

Item	Check Point
Antenna	1. Check the antenna for physical damage. 2. For wire antenna, check for loosened span and confirm that it is sufficiently separated from metallic objects.
Insulators	1. Check for damage and salt deposits. Remove salt deposits with fresh water. Replace damaged insulators. 2. Confirm that the lead-in wire is firmly connected. Check metallic parts for rust.
Antenna Coupler	1. Confirm that the antenna wire is firmly connected. 2. Confirm that the cover is firmly tightened. 3. Check for loosened coaxial cable. 4. Check for loosened ground connections. 5. Check the vent hole for foreign material. (A vent tube is mounted at position Ⓐ in Fig. 2-1.)
Transceiver Unit	1. Confirm that no objects prevent circulation of air at the cooling fans. 2. Confirm that the coaxial cable is properly seated. 3. Check for loosened connection at input power terminals TB1/TB2.
Control Unit	1. Check all connection cables for proper seating.



ANTENNA COUPLER

TRANSCEIVER UNIT

Fig. 2-1 Location of Parts in Antenna Coupler and Transceiver Unit

SELF TESTS

Control Unit & Transceiver Unit

To execute a self test, press the **RCL** key, enter a test number and hit the **ENT** key. The LCD displays an appropriate indication during testing, and, after completion of the test, the results, either OK or an error message. For error messages, see pages 2-11 and 2-12.

To escape from a self test at any time, press any key after the test is completed.

Table 2-2 Self Tests

Test No.	Test	Indication During Testing
9900	All self tests except the key/LCD test	
TRANSCEIVER UNIT		
9910	Consecutive execution of tests 9911 to 9916	
9911	TX synthesizer on the EXC Board (PLL)	Checking Tx Local OSC
9912	MIC Input/Output on EXC Board Vc/Ic on PA Board SWR detection on TX FIL Board	Checking Tx board
9913	RX synthesizer on RX Board (PLL)	Checking Rx Local OSC
9914	RX Board	Checking Rx board
9915	ROM (U10) on CPU Board	Checking TRx ROM
9916	RAM (U12) on CPU Board	Checking TRx RAM
CONTROL UNIT		
9920	Consecutive execution of tests 9921-9925	
9921	Key Check The name of each key appears on the LCD. Press each key one by one, and its corresponding indication will be highlighted if the key is functioning properly.	
9922	LCD Check Properly functioning LCD segments appear in highlight.	
9923	AF Board	Checking AF board
9924	ROM (U9) on the CPU Board	Checking Control ROM
9925	RAM (U15/U21) on the CPU Board	Checking Control RAM
Connection between Transceiver Unit and Antenna Coupler		
9930	Connection between Transceiver Unit and Antenna Coupler	Checking ATU

Antenna Coupler

To check the Antenna Coupler for proper operation, press the **CHECK** button (S2) on the Coupler Board. The relays start chattering and LEDs CR1 to CR24 blink one by one in ascending order. If device failure is found, an appropriate LED lights to indicate the offending device:

Device	LED
ROM	CR1
RAM	CR2
A/D converter or SWR detector	CR3

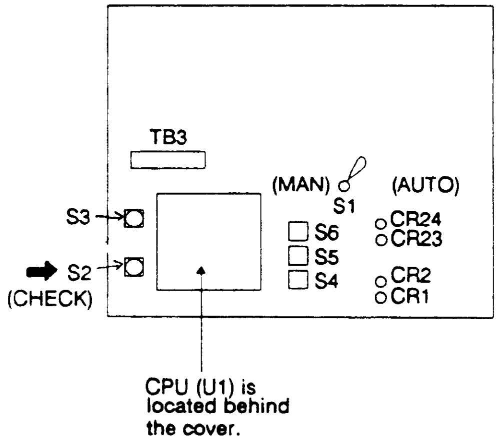


Fig. 2-2 CHECK Button on the Coupler Board

Note1: ROM/RAM/A/D converter are incorporated in the CPU.

TROUBLESHOOTING

Table 2-3 Troubleshooting Guide

Symptom	Cause	Remedy
Cannot turn set on.	1. Breaker in Transceiver Unit has tripped (refer to Fig. 2-1). 2. Input voltage out of rating (24/32 VDC, +30%, -10%), or poor connection. 3. Forinstallations which use an AC Rectifier, confirm that the rectifier is on and there is no blown fuse (refer to Fig. 2-4). 4. The following breakers may have tripped: CB2 to CB4 on the Interface Board of the Transceiver Unit (refer to Fig. 2-3) CB1 on the AF Board of the Control Unit (refer to Fig. 2-5)	1. Turn the breaker on. 2. Measure input voltage at TB1 (+)/TB2 (-) on the Transceiver Unit. If low, check for discharged battery. 3. Reset breaker. Replace fuse. If the fuse blows after replacement, call for service. 4. Reset breakers. If they trip again, call for service.
Power is on but no noise from speaker.	1. Speaker is turned off. (appears when the speaker is off.) 2. Sensitivity is too low.	1. Press the key to turn the speaker on. 2. Adjust sensitivity with the **SENSITIVITY** key.

Symptom	Cause	Remedy
Cannot receive SSB signal clearly.	1. Wrong class of emission 2. Frequency is off.	1. Select correct class of emission. 2. Tune with the **TUNE** key.
Cannot store user channel.	1. Memory is full (storage capacity: 1-8999, 400 channels max.).	
Time is wrong.	1. Backup battery on CPU Board (refer to Fig. 2-5) of the Control Unit has released its contents. (This occurs if the power is off for about one week.)	1. Reset the clock. (Press the **STO** and **CLOCK** keys to call up the time setting screen).
No scan receiving	1. Have not designated memory stored channels (ITU, DSC, or user) to be scanned.	1. Designate the channels to be scanned.
In scan receiving, cannot capture signal.	1. AGC is off. 2. Scan stop signal level setting is too high.	1. Turn AGC on. 2. Lower the setting. (Press the **STO** and **SCAN** keys to call up the scan parameter setting screen).
No sweep receiving, or cannot capture signal.	1. AGC is off. 2. Unsuitable sweep settings. <u>Sweep width</u> 100 = 100 kHz intervals <u>Step</u> 10 = 10 kHz intervals <u>Stop signal level</u> If too high cannot capture signal.	1. Turn the AGC circuit on. 2. Reenter settings. (Press **STO** and **SWEEP** keys to call up the sweep parameter setting screen).
No automatic antenna tuning.	1. Antenna is broken or damaged. 2. Bad connection between Antenna Coupler and Transceiver Unit. 3. AUTO/MAN 2182 switch (S1) inside the Antenna Coupler is set to MAN 2182 (refer to Fig. 2-6). 4. Breaker CB1 in the Antenna Coupler has tripped.	1. Check antenna connections and then check antenna itself. 2. Check connections. 3. Set to AUTO. 4. Reset breaker. If the breaker trips again, call for service.

Symptom	Cause	Remedy
L/L position does not appear when **LAT LON** key is pressed.	1. CIF/NMEA format data not input from external navigation device. 2. Wrong setting of input data format.	1. Check connection between navigation device and Control Unit. If normal, check navigation device for proper operation. 2. Set correctly. (Refer to page 5-4.)

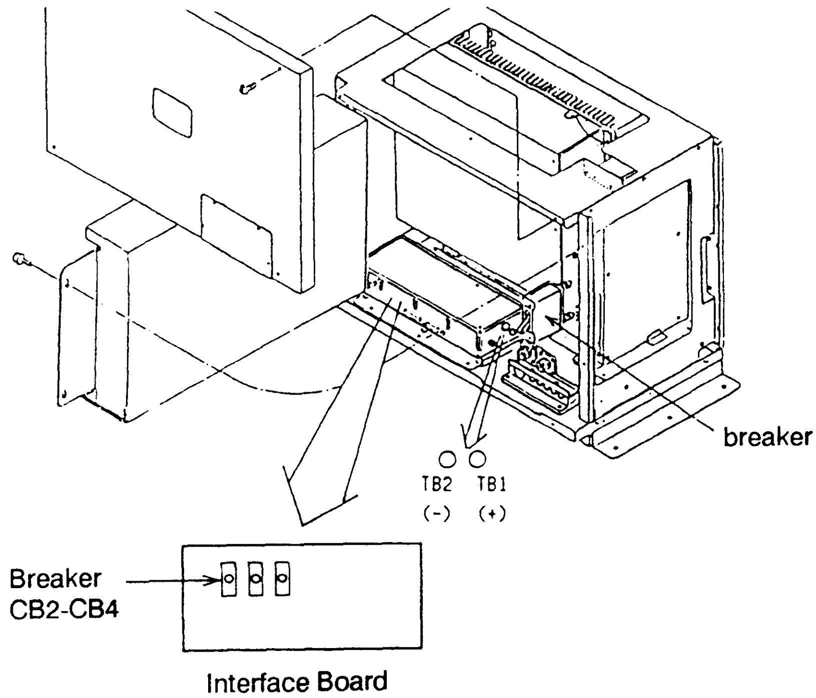


Fig 2-3 Transceiver Unit Inside View

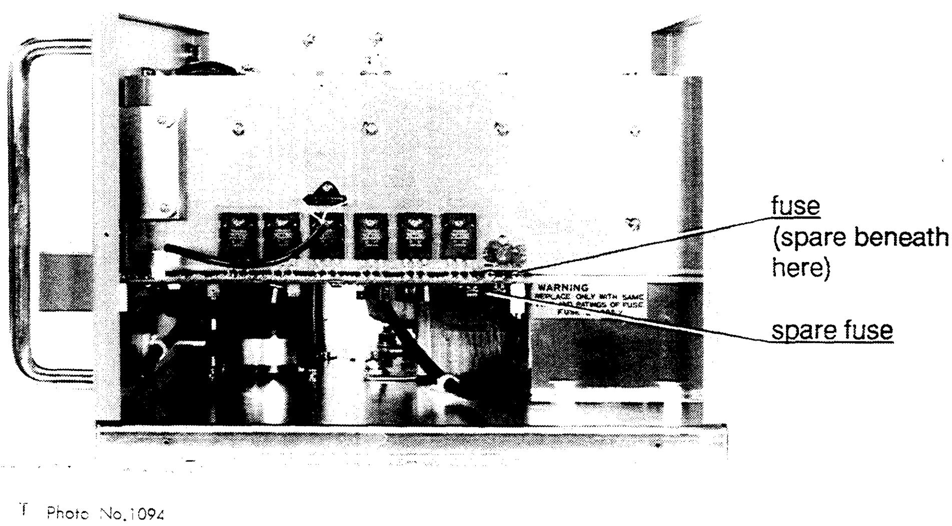


Fig. 2-4 Rectifier Unit, Cover Opened

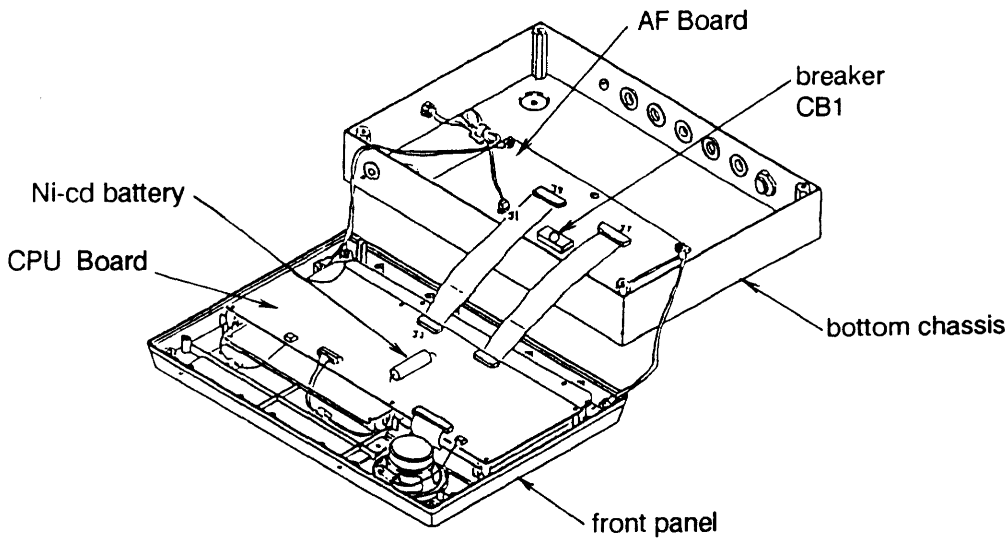


Fig. 2-5 Control Unit, Inside View

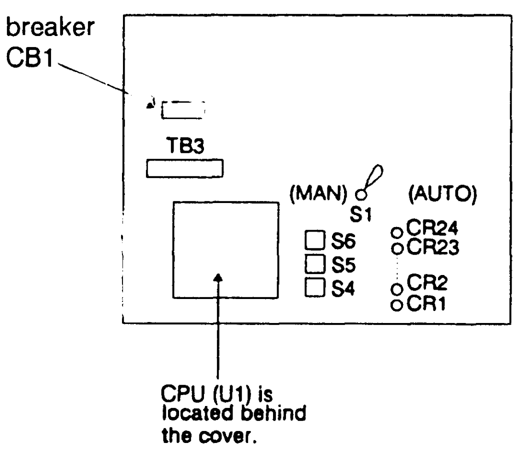


Fig. 2-6 Location of AUTO/MANUAL 2182 kHz Switch on the Coupler Board

ERROR MESSAGES

This set displays error message when it detects invalid key operation and equipment fault.

Table 2-4 Error Messages for Invalid Key Operation

Error Message	Reason	Remedy
Invalid Frequency	Frequency not within frequency range of the unit.	Select proper frequency. TX Frequency Range: 1.6065 MHz to 29.9999 MHz RX Frequency Range: 10 kHz to 29.99999 MHz
Invalid Channel	Invalid channel number	Channel Numbers are: DSC: 1-79 User: 1-8999
Can't change BFO frequency	Cannot select BFO frequency except in CW, FAX or TELEX mode.	Select CW, FAX or TELEX.
First select channel	Scanning attempted without selecting channel.	Select channel.
Dif. between TxF and RxF too small	In duplex communications, frequencies of TX and RX are too near one another.	Check the frequencies.

(continued on next page)

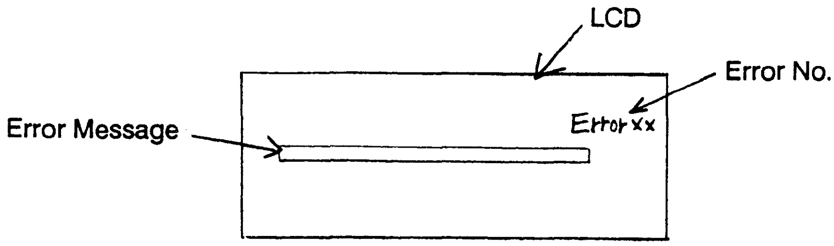
Table 2-5 Error Messages for Equipment Fault and Other

Error Message	Reason	Remedy
COMM Error	Trouble with data communication between CPU's of the Control Unit and Transceiver Unit.	Try to repeat key operations. If this does not work, reapply the power.
TX tuning Error	Trouble with antenna and/or automatic tuning circuit in the Antenna Coupler, or Antenna Coupler connections have loosened.	First, check the antenna. Then, check for loosened connections. If these are in good order, there may be trouble with the automatic tuning circuit.
Tx frequency unlocked	Problem with TX local OSC	Retry key operations. If the error message reappears, try replacing the EXC Board/REF OSC Board.
Rx frequency unlocked	Problem with RX local OSC	Retry key operations. If the error message reappears, try replacing the RX Board/REF OSC Board.
Excessive Ic on PA (*)	Excessive collector current	Retune. Check antenna.
Excessive power reflected (*)	Too many reflections	
High temperature on PA (*)	High temperature at power transistor on the PA Board	Wait for a while and then retransmit.
No position data input	The **LAT LON** key was pressed to display ship's L/L position, but CIF or NMEA format data is not input to the CPU of the Control Unit.	No connection with navigation device (CIF/NMEA output): Run shielded twist-pair cable between navigation device and the Control Unit. Connection with navigation device (CIF/NMEA output): Confirm that the navigation device is correctly outputting L/L position data. If it is, there may be a problem with the I/O port on the Control Unit. In this case, call for service.

(*) Output power is reduced automatically.
("FULL" → "LOW1")

Error Messages for self tests

If one of the error messages shown below appears at self tests, check the corresponding boards.



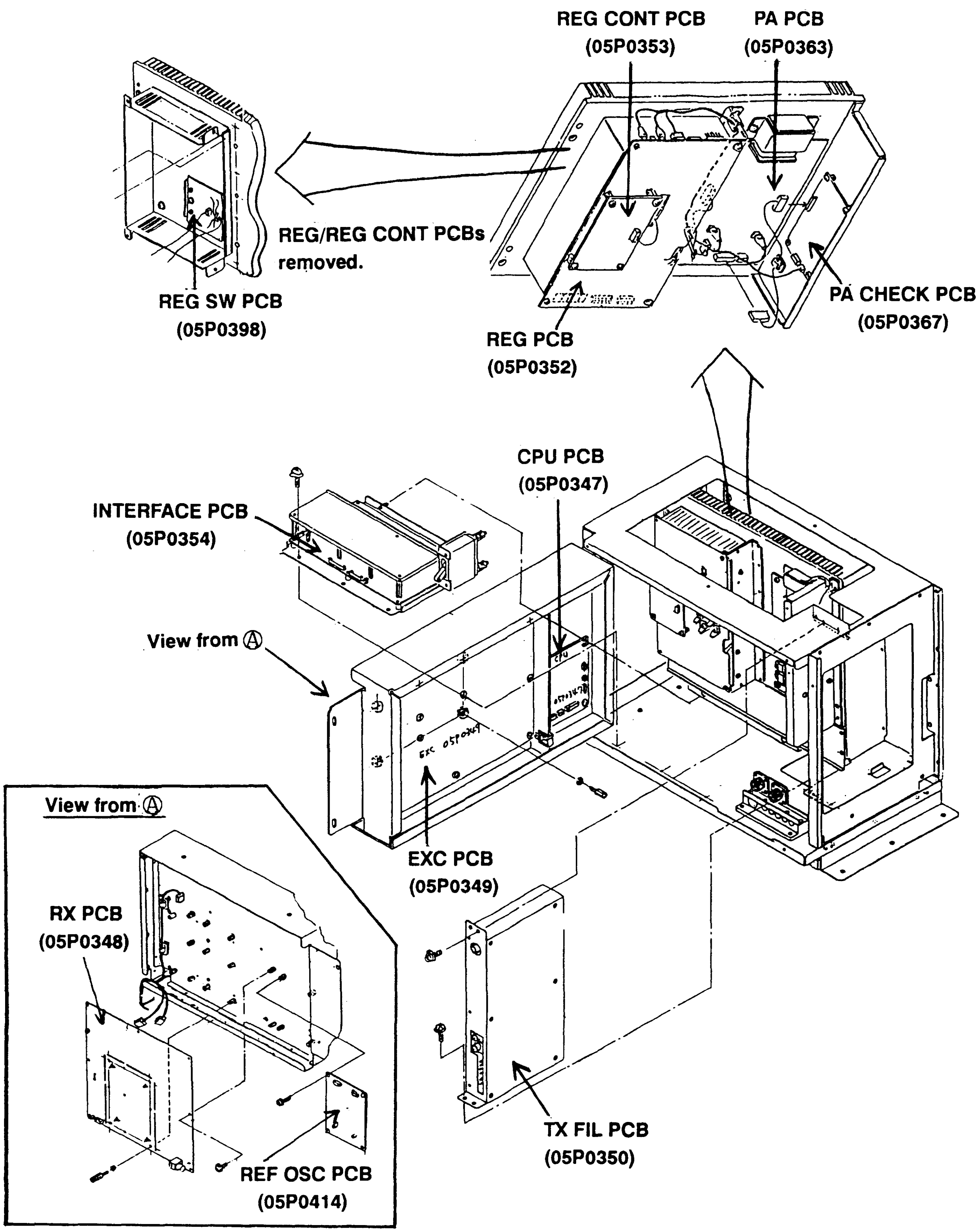
Test No.	Error No.	Error Message	Check Point
9915/9916	1	CPU/Communication error	CPU board (in the transceiver unit) or Interconnection cable
9924/9925	1	CPU/Communication error	CPU board (in the control unit) or Interconnection cable
9923	2	No Tx AF signal on AF PCB	AF board
	3	No Rx AF sig. on AF PCB or TRx unit	AF board or RX board
	4	No SQ AF signal on AF PCB	AF board
	5	SQ not open on AF PCB	
	6	SQ not closed on AF PCB	
9913	7	Unlock freq.xxxx.xx kHz on RX PCB	RX board
9911	8	Unlock freq. xxxx.xx kHz on EXC PCB	EXC board
9914	9	No Rx signal through BPF on RX PCB	RX board
	10	No Rx signal through Pre-sel on RX PCB	
	11	No Rx signal on RX PCB	
	12	No S signal on RX PCB	
	13	Unable to control sensitivity on RX	
	14	Unable to mute Rx on RX PCB	

Continued

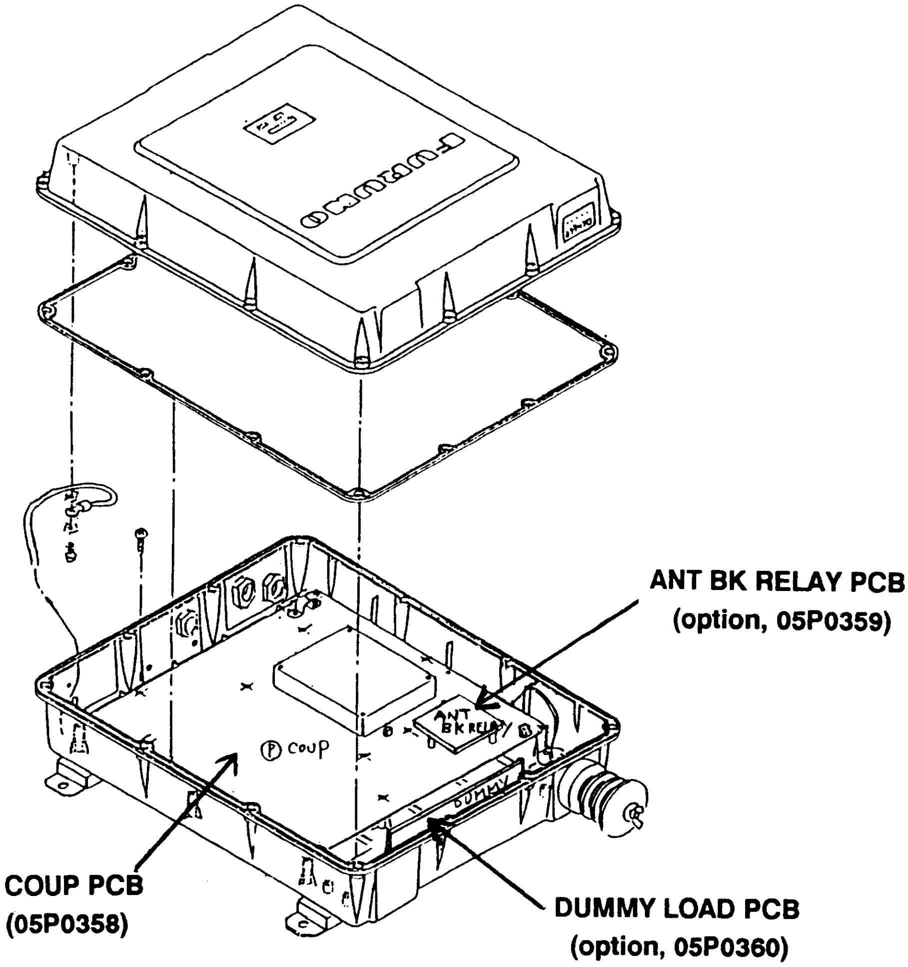
Test No.	Error No.	Error Message	Check Point
9912	15	No Mic signal from Control Unit on EXC	AF board, EXC board or Interconnection cable
	16	No Tx signal on EXC PCB	EXC board
	17	Unwanted Tx signal on EXC PCB	
	18	Insufficient source voltage	Low input voltage
	19	Insufficient PA Vc	REG Unit (+45V line voltage)
	20	Excessive PA idle current	PA board
	21	High temperature on PA	Temperature at PA board exceeds 90 °C.
	26	Unwanted Tx signal on PA or TX FIL PCB	PA board or TX FIL board
	29	No Tx signal on PA or TX FIL PCB	PA board, TX FIL board or Interconnection cable
	33	No Tx signal on PA	PA board
	35	No Tx signal on TX FIL PCB	TX FIL board
9930	32	No acknowledge signal from Coupler	COUP board

PCB LOCATIONS

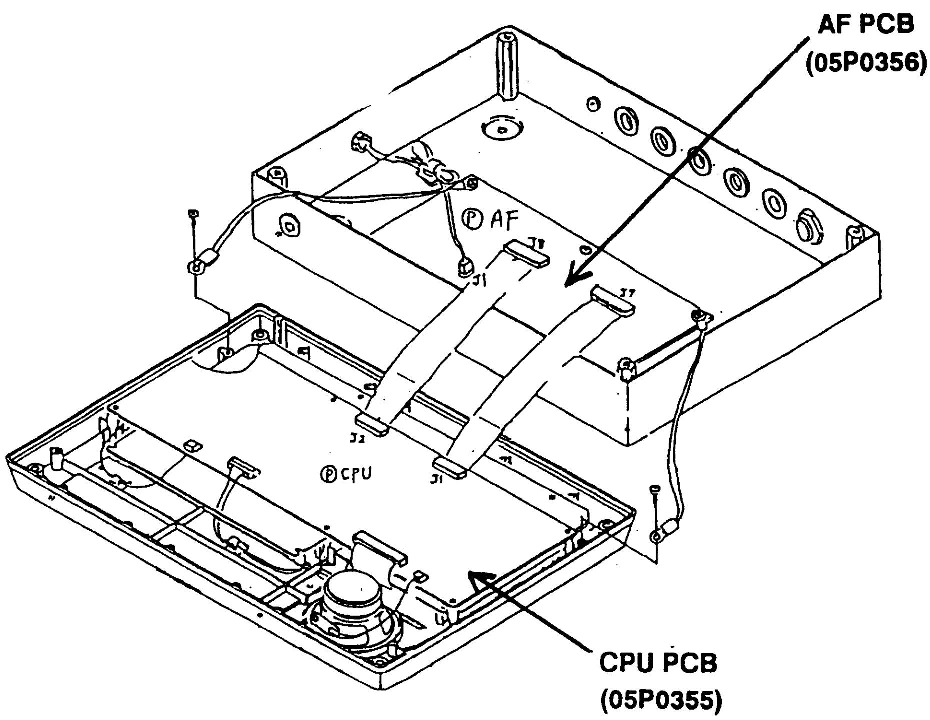
1) Transceiver Unit



2) Antenna Coupler



3) Control Unit



3. INSTALLATION

GENERAL

This section provides information necessary for installation. Installation consists mainly of siting and mounting the units of the system, laying and connecting interconnection cables and power cable, erecting a suitable antenna and ground system and checking the unit for proper operation.

Proper installation is important for good performance and reliability. Antenna and ground connections must be made properly using corrosion resistant materials. Cable routing should be planned to protect cables from physical damage. Fabricate the armor and shield of cables according to the recommended procedure.

For duplex communication, be sure the receiving antenna and transmitting antenna are well separated from one another (5 meters or more) to prevent mutual interference. The coaxial cable used to make the connection between the Transceiver Unit and the receiving antenna should have a dual shield and armor.

The battery must be able to supply ample current so the transmitter is to be able to deliver full power to the antenna. Unless the current flow is available, the radio won't transmit effectively. To deliver power efficiently, the power cable must be at least 14 sq. (22 sq. cable is recommended).

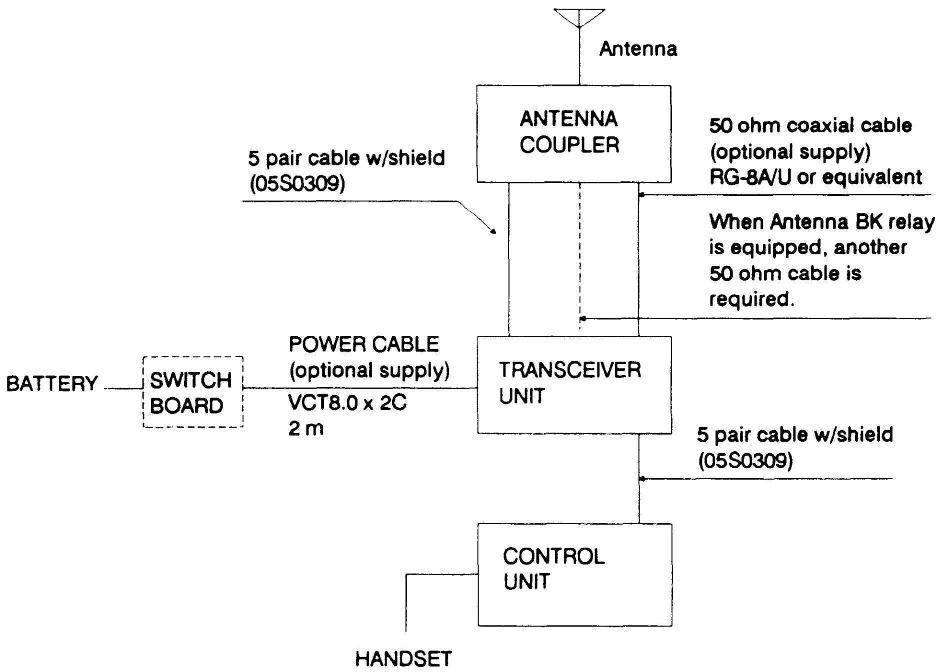
The maximum length of the interconnection cable between the Control Unit and Transceiver Unit and between the Transceiver Unit and Antenna Coupler is 50 meters. Keep this distance in mind when selecting a mounting location. Cables should not be routed with the cables of other equipment to prevent mutual interference.

When the ANT BK RELAY Board is installed (at the factory) but not used, detach it from the coupler to prevent damage to the board by transmission signal induction.

Observe the compass safe distances (the minimum distances the units of the FS-5000 system should be separated from compasses) shown below.

Unit	Standard (m)	Steering (m)
Control	0.9	0.7
Transceiver	2.0	1.5
Antenna Coupler	1.0	0.7
Rectifier	1.5	1.2

The figure below shows the standard connection method for simplex communication.



Note: Armored cables can be optionally supplied instead of 5 pair cable/coaxial cable. We recommend use of armored cables when the Antenna Coupler is installed outdooors, to prevent cable damage. Armored cables should be grounded at transceiver side. For cable fabrication at antenna coupler side, refer to page 3-17.

Fig. 3-1 Connection Method for Simplex Communication

INSTALLATION & COMMUNICATION

The method of installation depends on the type of communication required: simplex or duplex. For simplex communication the method depends what TX/RX frequencies are to be used.

Duplex Communication

Duplex communication requires a receiving antenna. For connecting a whip antenna to the coaxial cable, use a receiving antenna junction box and dual shield coaxial cable w/armor (local supply). Be sure to locate the receiving antenna at least 5 meters from the transmitting antenna (as far as possible). To reduce transmission noise, it is better to set AGC time and NB to "FAST" and "ON", respectively.

Note that the R ANT SEL Board (option) is available for duplex comunications. For further details, refer to page 3-12b.

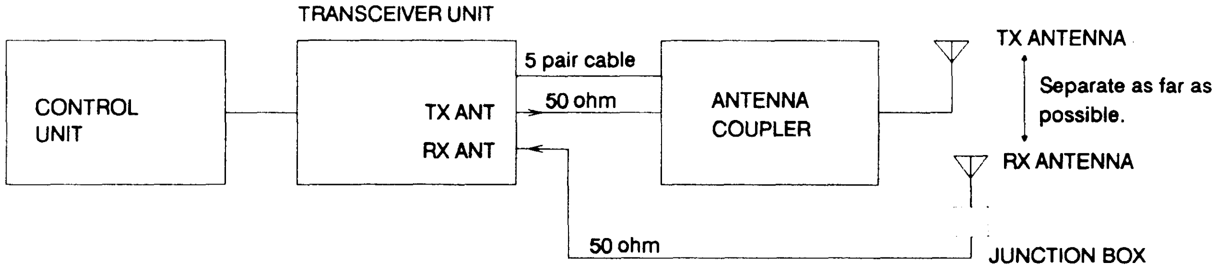


Fig. 3-2 Connections Required for Duplex Communication

Further, change the wiring in the Transceiver Unit as shown in Fig. 3-3. Remove the coaxial cable connected between the extension connector of the TX FIL Board and the RX ANT terminal. Connect the receiving antenna to the RX ANT terminal.

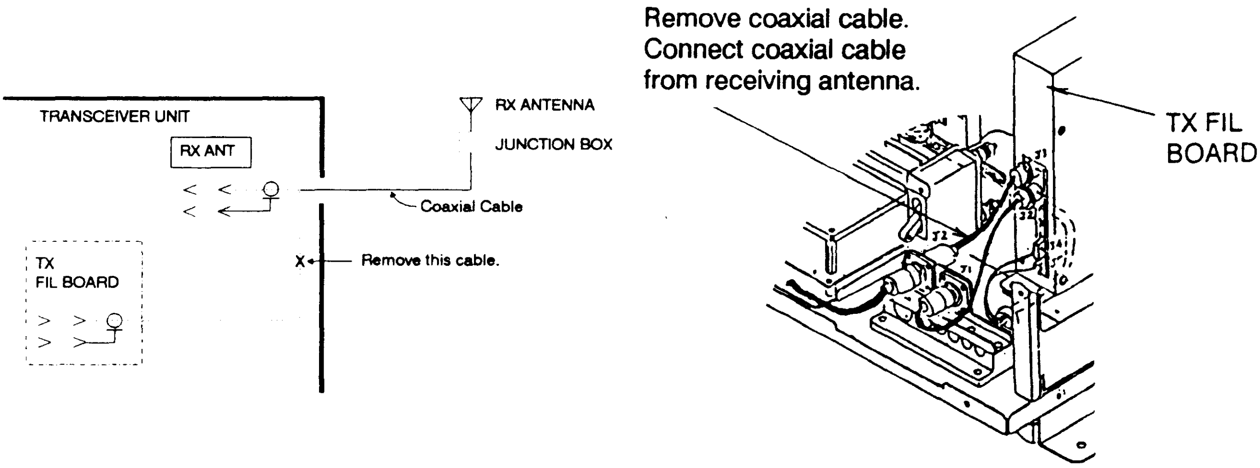


Fig. 3-3 Modifying the Transceiver Unit for Duplex Communication

Simplex Communication

The Transceiver Unit is equipped with a 50 ohm BK relay for switching the TX and RX lines.

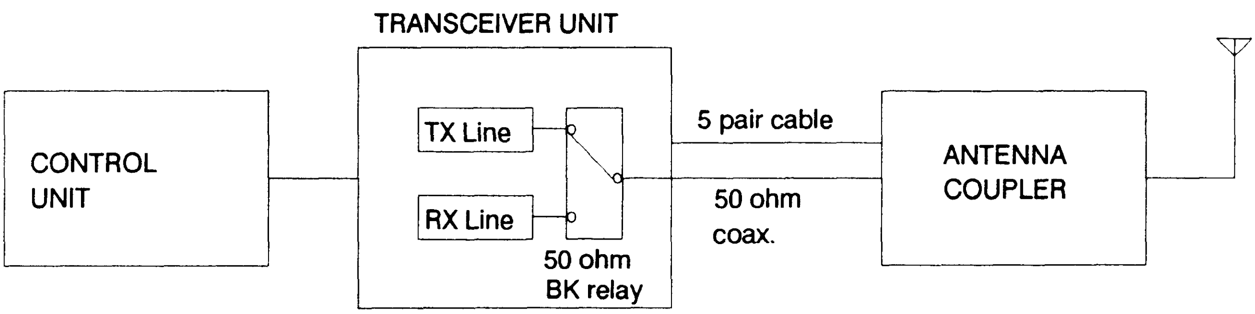


Fig. 3-4 BK Relay in the Transceiver Unit

MF Two-frequency Communication

When the frequencies of an MF band TX and RX frequency pair are disimilar, loss of RX signal may result because the antenna coupler will be tuned for the TX frequency (in HF band, the difference between TX and RX freq. is comparatively small). To solve this problem, install the optional Antenna BK relay to get TX/RX switching at the base of the antenna.

Note: *To install the Antenna BK relay, two coaxial cables must be run between the Antenna Coupler and the Transceiver Unit.*

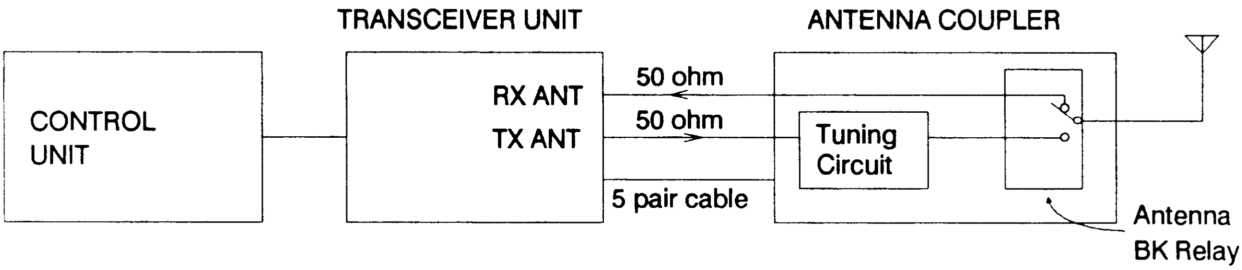


Fig. 3-5 Antenna BK Relay

Further, change the wiring in the Transceiver Unit as shown in Fig. 3-6. Remove the coaxial cable connected between the extension connector of the TX FIL Board and the RX ANT terminal. Connect the coax. cable from the Antenna BK Relay board to the RX ANT terminal.

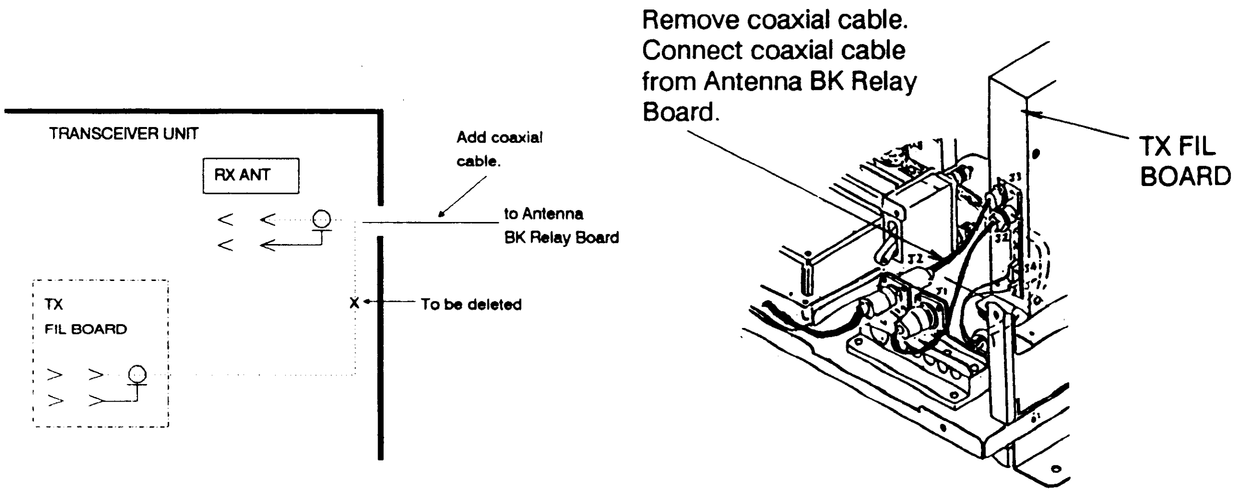


Fig. 3-6 Modification Required When Antenna BK Relay is Used

Note: *If receiving antenna is connected in the same manner as for duplex communication, Antenna BK relay is not required.*

ANTENNA

Transmitting Antenna

The transmitting antenna should satisfy the following requirements:

- Total antenna length is 7 to 18 meters.
- The length of the vertical portion should be longer than 4 meters, and the slant angle of that part should be within 5 degrees.
- Separate it as far as possible from:

  stays
  metallic objects
  direction finder antenna
  INMARSAT radome antenna

- Locate the insulator away from funnels, etc.
- If the Antenna Coupler is installed out of wheelhouse, use a lead-in insulator (Furuno type YA-256) to make the connection. If necessary use a high quality antenna switch and stand-off insulator.
- If the antenna is connected directly to the coupler, use a strain insulator to prevent insulator fatigue.

Receiving Antenna

A receiving antenna is required for duplex communication. Furuno can supply two types of receiving antennas: FAW-6R2 (six meter whip w/standard mounting bracket), or FAW-6R2A (six meter whip w/universal mount).

The receiving antenna should be separated at least 5 meters from the transmitting antenna (as far as possible).

Install a receiving antenna junction box at the base of the antenna. Run a dual shield coaxial cable w/armor between the antenna and the RX ANT terminal on the Transceiver Unit.

MOUNTING THE CONTROL UNIT

Mounting Considerations

The Control Unit may be mounted on the bulkhead, a tabletop or a panel (flush mounting). When selecting a mounting location, keep the following points in mind.

- Keep the unit free of water splash.
- Keep the unit out of direct sunlight.
- Select a location where the controls can be easily operated.
- Leave enough space on the sides of the unit to permit checking and maintenance.

*: *Slant mounting plate is optionally supplied. (Ref to page AP2-1.)*

Mounting (Refer to page D-2.)

1. Dismount the front panel by loosening four screws.

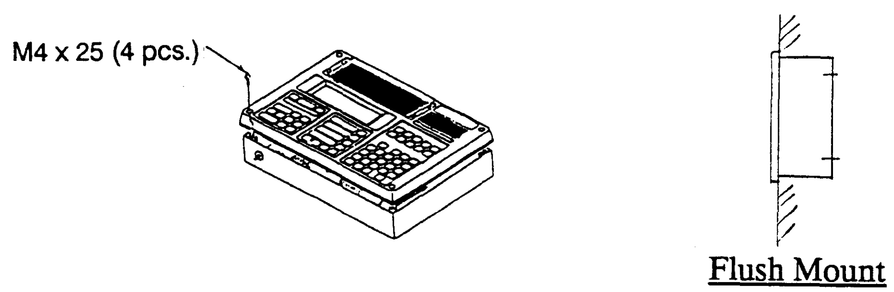


Fig. 3-7 Location of Front Panel Fixing Screws

2. Separate the bottom chassis from the top chassis by removing the two stoppers and two flat cables shown in Fig. 3-8.

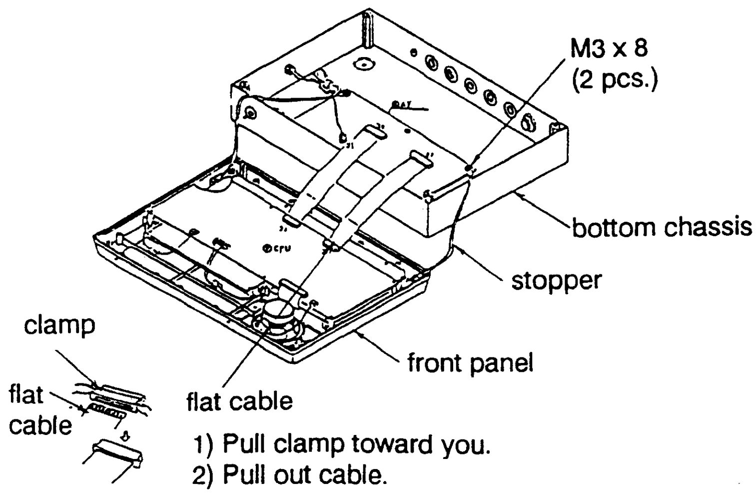


Fig. 3-8 Separating the Top and Bottom Chassis

3. Referring to the figure below, drill four pilot holes in the mounting location.

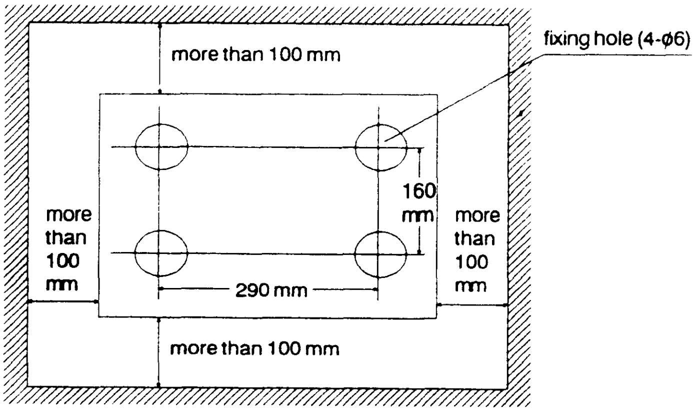


Fig 3-9 Mounting Dimensions of the Control Unit

4. Fix the bottom chassis to the mounting location with the tapping screws and washers supplied. *(The bottom chassis can be rotated 180° to facilitate cable routing.)*

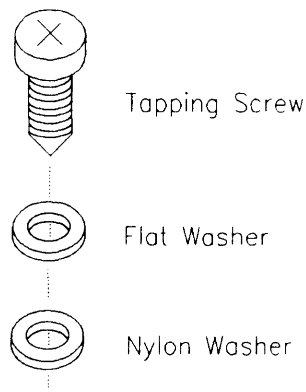


Fig. 3-10 Hardware for Mounting the Control Unit

Wiring

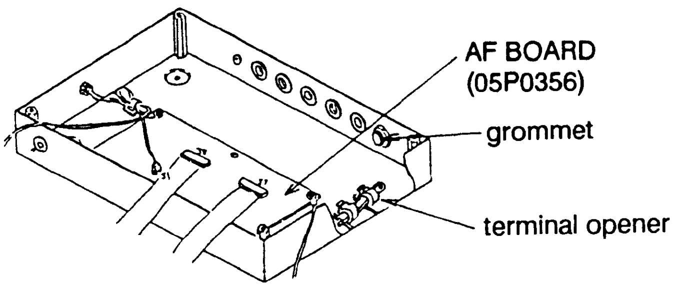
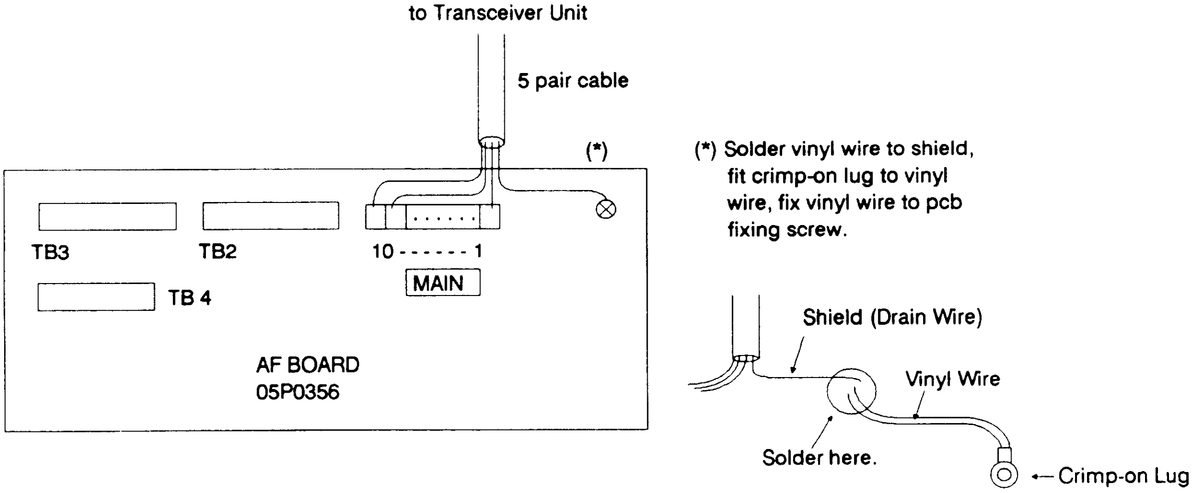
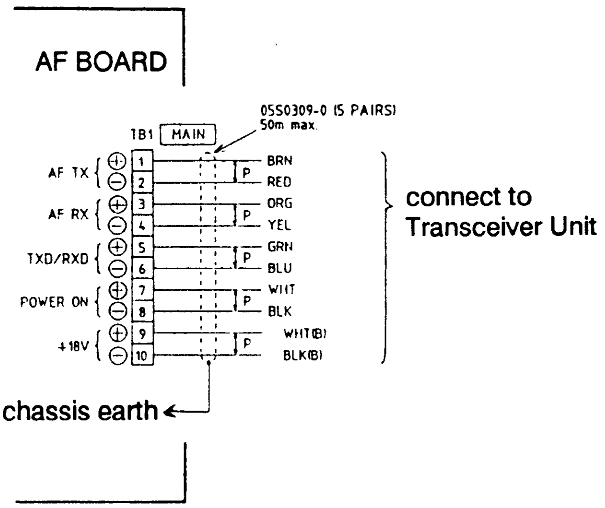


Fig. 3-11 Location of Parts Inside the Control Unit

Transceiver Unit

Connect the five pair cable to TB1 on the AF Board as shown in the figure below. Use the terminal opener to make the connection.



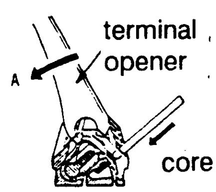


How to Use the Terminal Opener

1. Remove the end of each core by 5-6 mm.



2. As shown in the figure, set the opener in a terminal. While pulling the opener downward, insert the core.



3. Release the opener. Tug on the core to confirm it is inserted properly.

4. If the opener is not available, use a small slotted-head screw-driver. Insert the screwdriver in the terminal and while pushing it upward, insert the core.

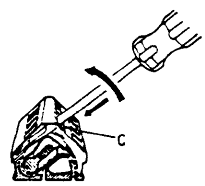


Fig. 3-12 Connecting the Cable from the Transceiver Unit to the AF Board

MIC Input Terminal

The handset is normally connected on the left side of the front panel, however it can also be connected on the upper side (A or C in Fig. 3-13) or the lower side (B in Fig. 3-13) of the unit.

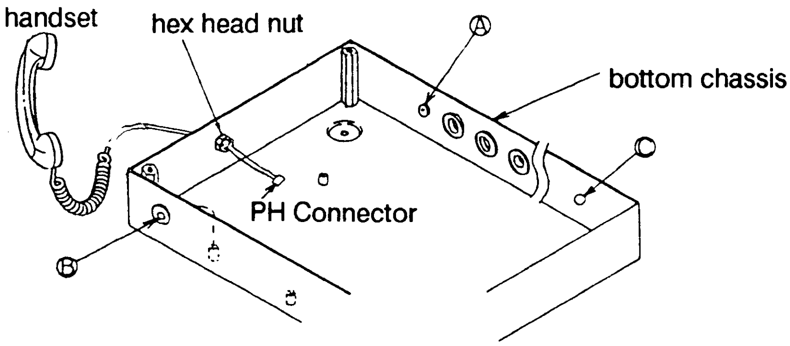


Fig. 3-13 Cable Entries for the Handset

Optional Equipment

Pass a grommet (supplied) onto the cables of optional equipment. Connect the cables to proper jacks on the AF Board, using the plugs, jacks and clamps supplied.

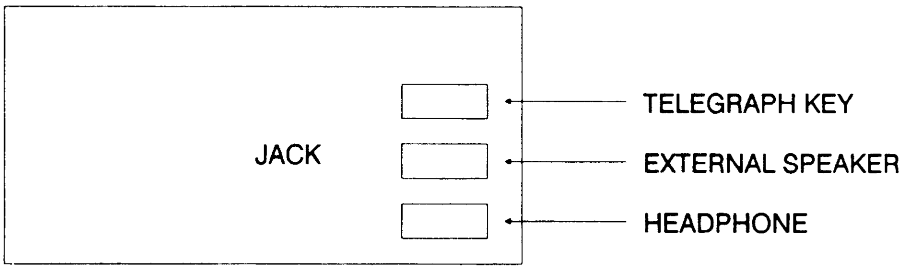


Fig. 3-14 AF Board, Showing Location of Jacks for Connecting Optional Equipment

Ground Connection

Making the length as short as practical, run a ground wire (IV-8 sq. or heavier, local supply) between the ground terminal on the Control Unit and the ship's superstructure or grounding bus.

MOUNTING THE TRANSCEIVER UNIT

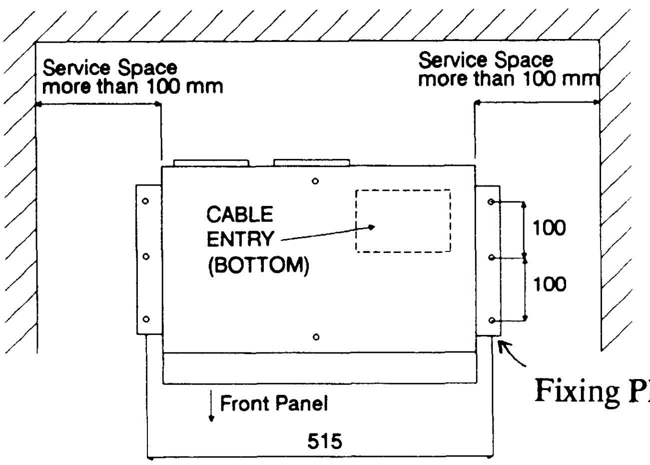
Mounting Considerations

The Transceiver Unit is designed for indoor mounting. It can be mounted almost anywhere provided the location satisfies the following requirements.

- Vibration-free location
- Well-ventilated area
- Free of water splash
- Leave enough space around the sides of the unit to permit maintenance and checking.
- The mounting location must be able to support the weight of the unit (20 kg) under the condition of continued vibration normally encountered aboard the vessel.

Mounting (floor or bulkhead)

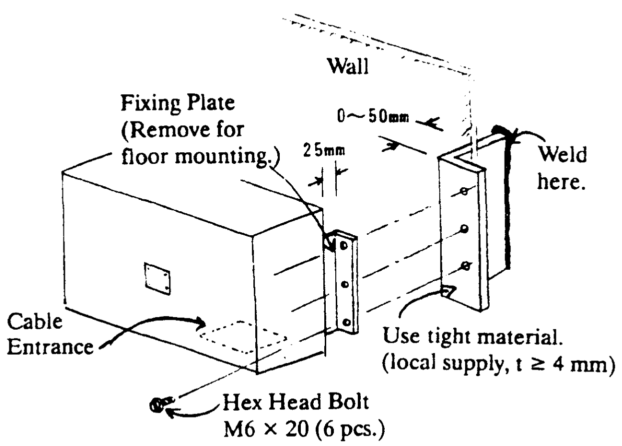
Fix the unit to the chosen location with six tapping screws and six washers (supplied).



(Refer to page D-3.)

Dimensions: mm

Floor Mounting



(Refer to page D-3a.)

Bulkhead Mounting

Note 1. Reinforce mounting location if necessary.

2. Leave at least 25 mm space behind the unit, preferably 50 mm, for maintenance and checking as shown above.

Fig. 3-15 Mounting Dimensions of the Transceiver Unit

Wiring

Four cables are terminated at the Transceiver Unit:

1) Power Cable (optional supply)
2) Two of Five pair cables (from the Control Unit and Antenna Coupler)
3) Coaxial Cable (from the Antenna Coupler)

For connecting peripheral equipment:

1) Cable for BK (break-in control)
2) One coaxial cable for duplex communication or "Antenna BK Relay".

For the wiring required for duplex communication, see page 3-2. And for Antenna BK relay connection, see pages 3-4 and 4-3.

The Transceiver Unit has a cable entry at its bottom, front and rear. To use the front panel cable entry, see the instructions at the top of the next page. To use the rear cable entry, remove the rear blind plate.

Connect the power cable and five pair cables to the Interface Board (05P0354). For connection to the terminal board, use the terminal opener provided. Connect the coaxial cable to the extension connector, using the coaxial connector supplied.

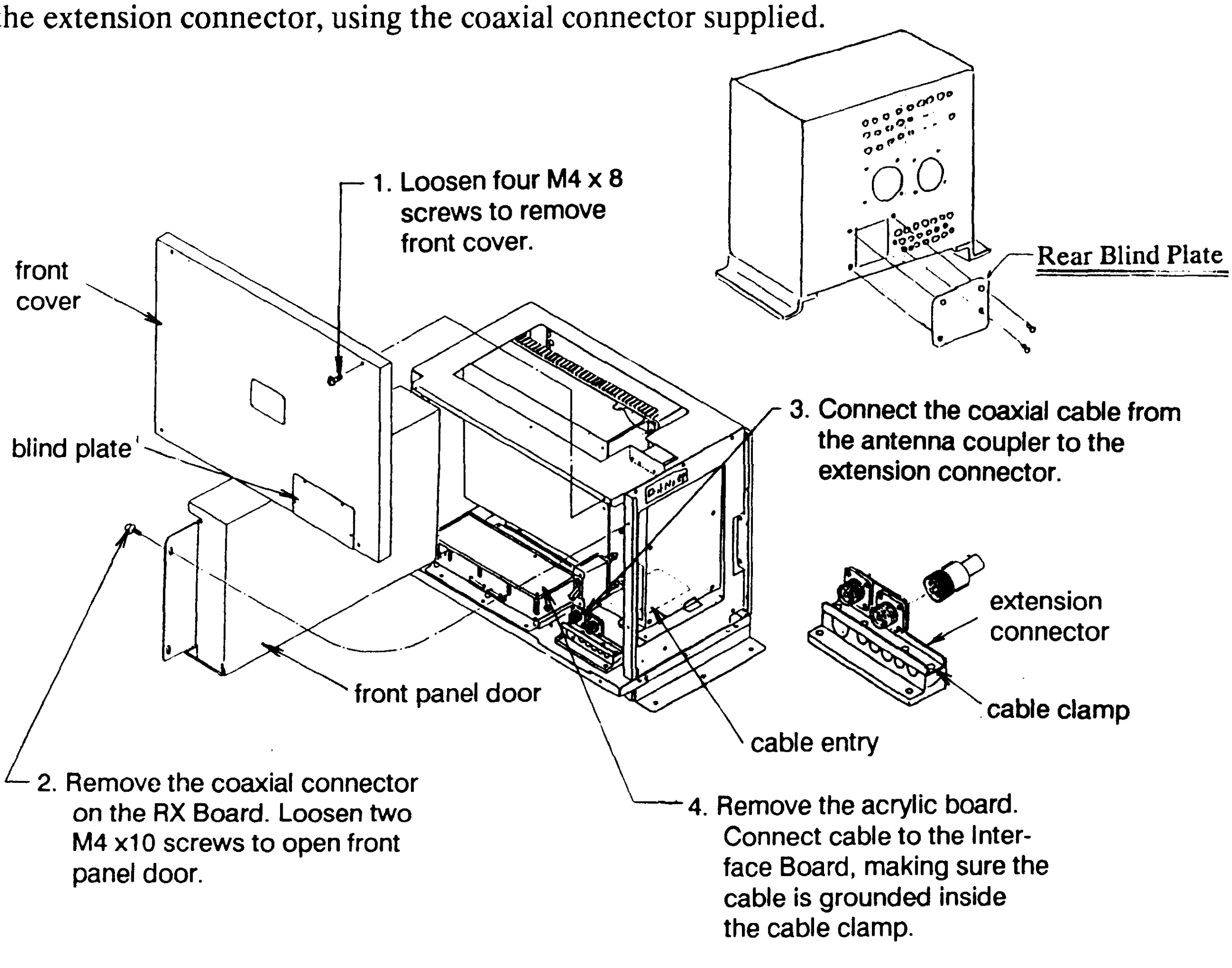
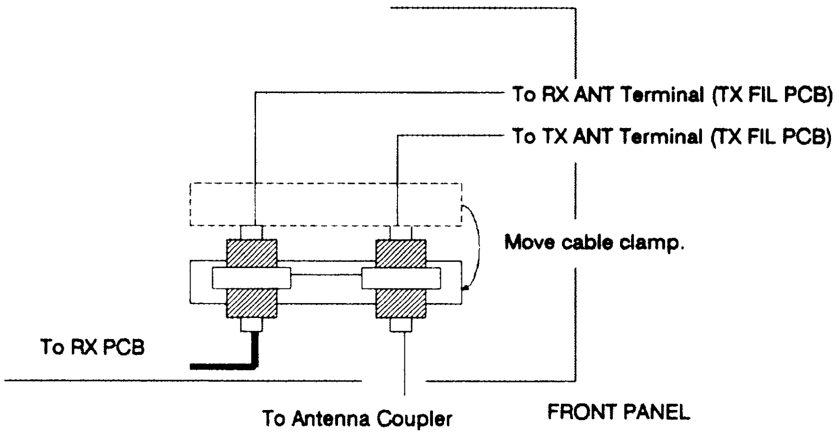


Fig. 3-16 Transceiver Unit, Cover Opened

FOR FRONT PANEL CABLE ENTRY

1. Relocate the cable clamp as shown in the figure below.
2. Change the wiring at the TX ANT terminal on the TX FIL Board as shown below.



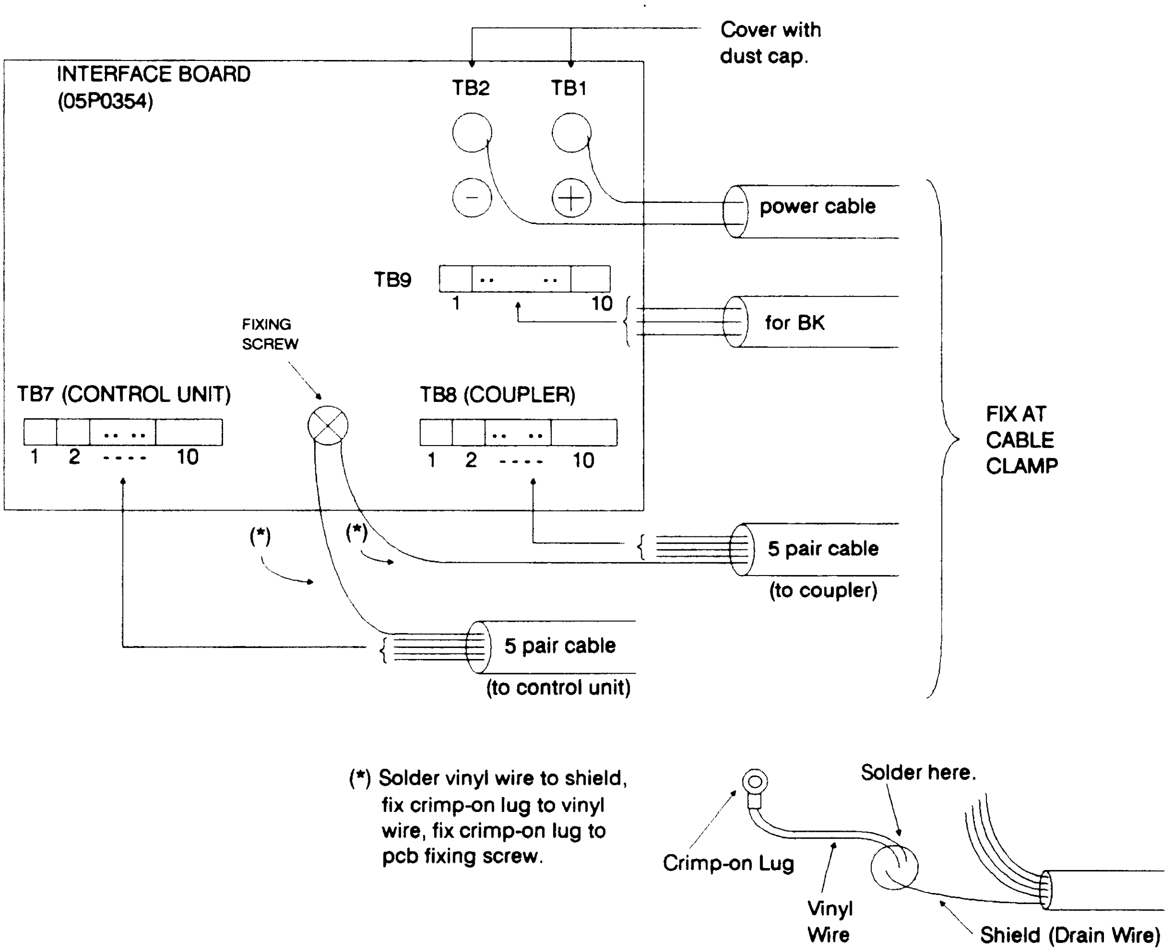
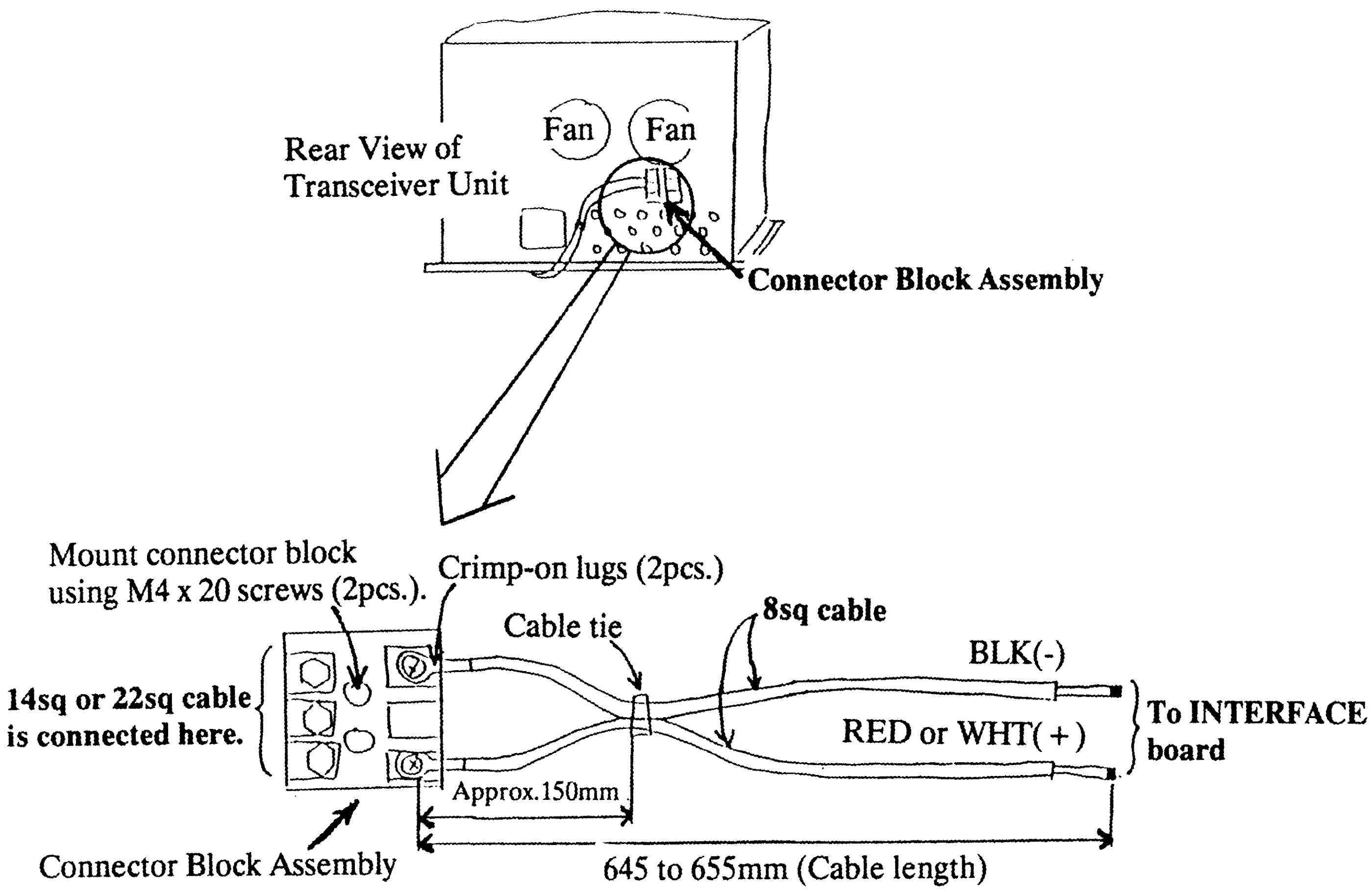


Fig. 3-17 Cable Connections on the Interface Board

OPTIONAL SUPPLY OF CONNECTOR BLOCK ASSEMBLY

(Terminal Board for Power Supply)

The 14sq or 22sq cable is available for power supply by using the connector block assembly which is mounted on the rear panel of the transceiver unit.



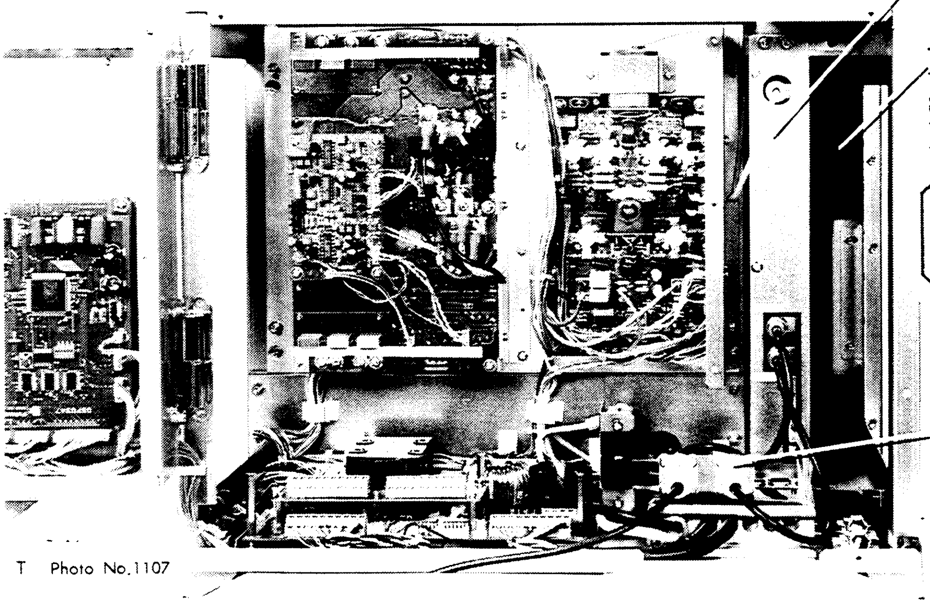
Model	Type	Code No.
FS-5000	OP05-49	005-841-200
FS-8000	OP05-48	005-841-190

INSTALLATION OF R. ANT SEL BOARD (Option)

(To use duplex receiving antenna only for duplex mode.)

For duplex operation, a 6 to 7 meter whip antenna and a receiving antenna with a junction box are installed. The received signal is fed to the transceiver unit through coaxial cable. The receiving antenna, however, is not so sensitive for MF simplex and semi-duplex operations due to insufficient length of antenna and incorrect impedance matching.

The R. ANT SEL Assembly is prepared to choose the best antenna for reception.

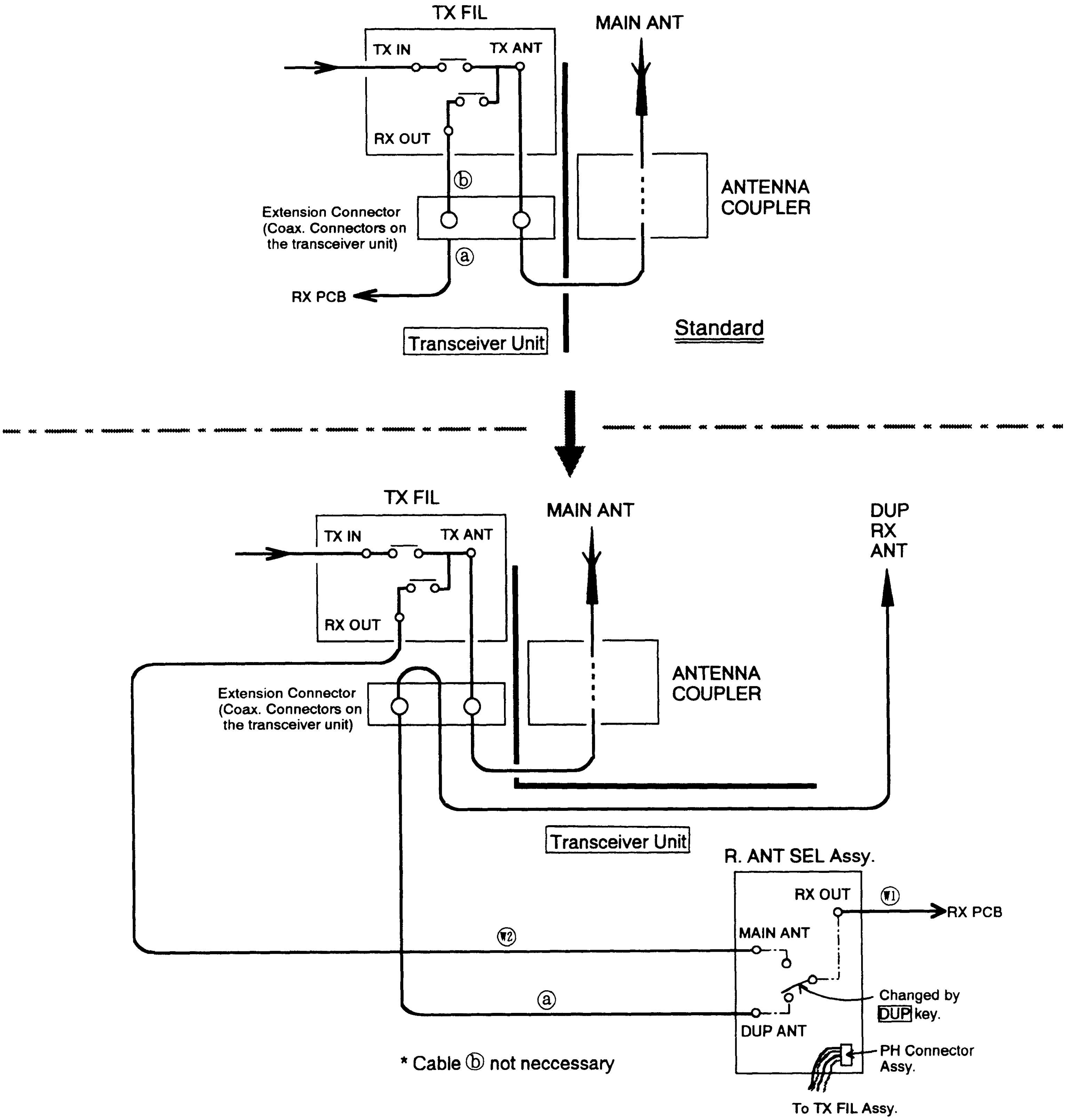


Transceiver Unit

Installation Materials

1. BNC (W1) BNC ---------- Cable
2. (W2) ---------- Cable
3. -------- BNC-M Conversion Connector
4. -------- M-M Coax. Connector
5. PH Connector Assy. (1 set)
6. Screws (4 pcs.)

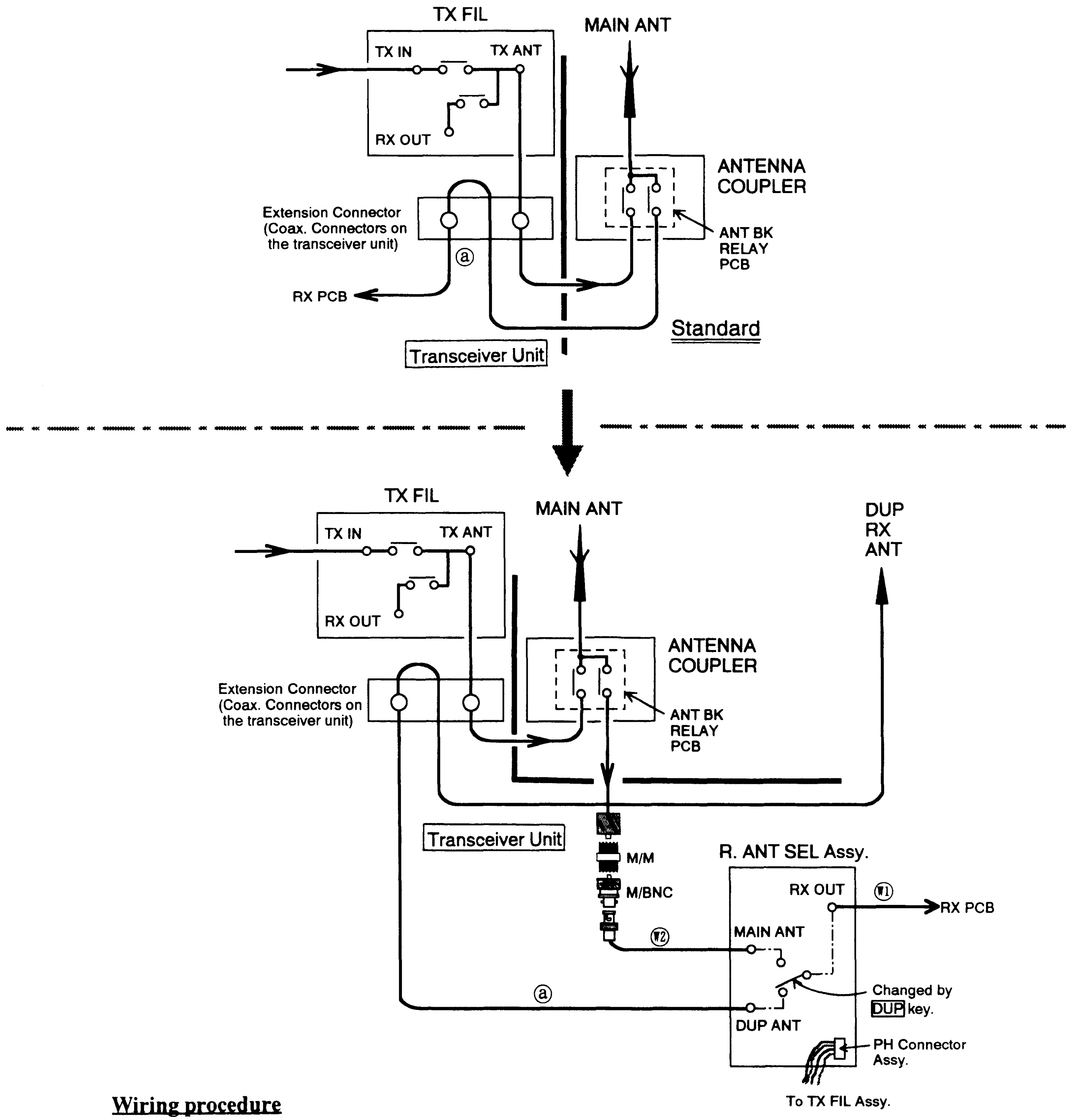
WITHOUT ANT BK RELAY PCB



Wiring procedure

1. Change connection of cable ⓐ from "RX PCB" (input connector) to "DUP ANT" connector on R. ANT SEL PCB.
2. Remove cable ⓑ.
3. Connect cables (W1), (W2) and PH connector assy. as shown above.
4. Connect duplex receiving antenna to extension connector (coax. connectors on the transceiver unit).

WITH ANT BK RELAY PCB



Wiring procedure

1. Change connection of cable ⓐ from "RX PCB" (input connector) to "DUP ANT" connector on R. ANT SEL PCB.
2. Connect cable (W1) and PH connector assy. as shown above.
3. Disconnect cable mated with ANT BK RELAY PCB inside Antenna Coupler at extension connector.
4. Connect "MAIN ANT" connector on R. ANT SEL PCB and ANT BK RELAY PCB by using cable (W2) and conversion connectors.
5. Connect duplex receiving antenna to extension connector (coax. connectors on the transceiver unit).

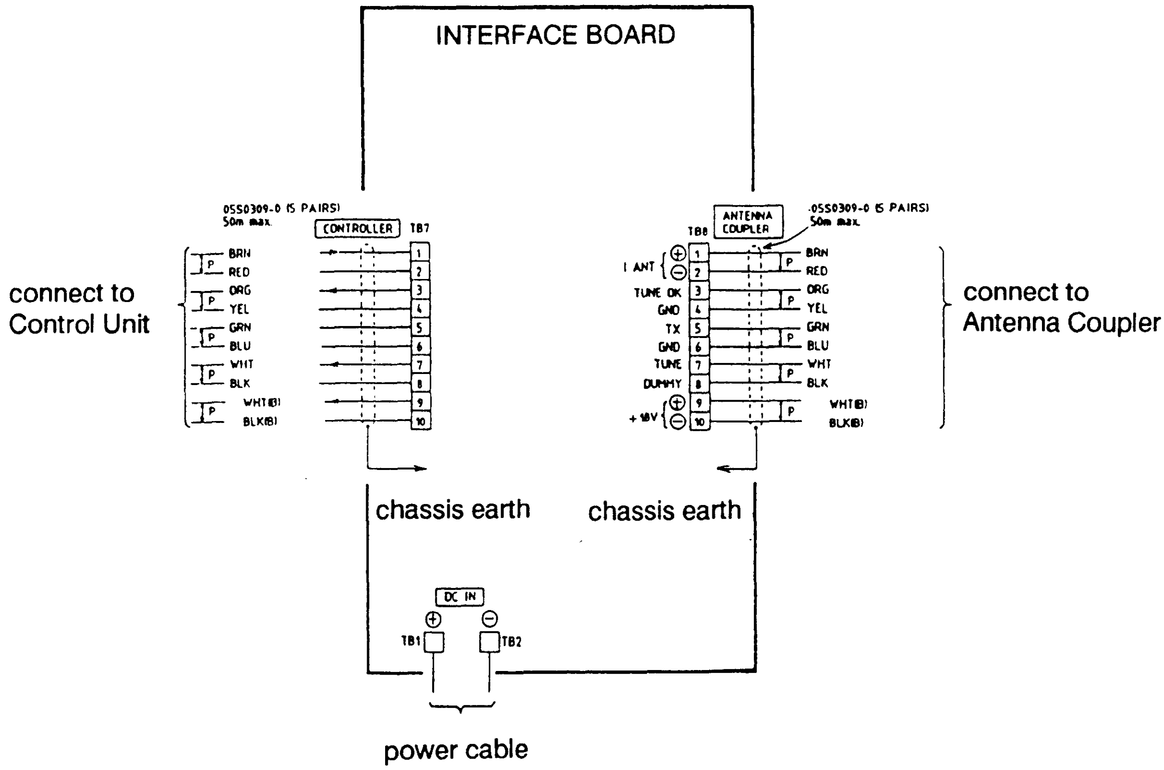


Fig. 3-18 Wiring on the Interface Board

After wiring the Transceiver Unit, seal the cable entry with putty.

Ground Connection

Loosen the two screws fixing the cable clamp. Making the length as short as possible, run a copper strap of 50 mm width (option) between the cable holder and the ship's superstructure or grounding bus.

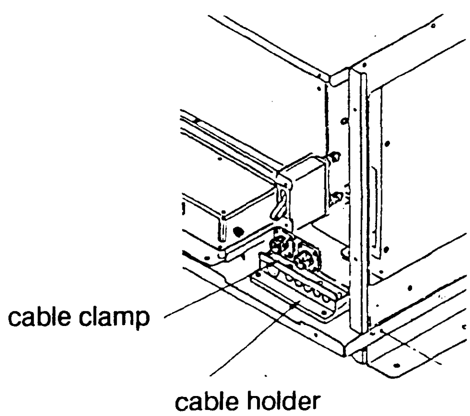


Fig. 3-19 Making the Ground Connection on the Transceiver Unit

MOUNTING THE ANTENNA COUPLER

Mounting Considerations

Outdoor Installation

- The Antenna Coupler is water resistant, however it is not designed to take a continual soaking. If necessary, seal any opening in the top or sides with silicone sealant.
- All wires from the coupler to the antenna radiate radio energy. They should be kept as short as possible and routed away from any grounded conductors such as lifelines, mast shrouds, or fittings.
- For optimum radio energy, locate the coupler as near to the ground as possible.
- The length of the vertical portion of the antenna should be as long as practical.
- Leave enough space around the sides of the unit to permit maintenance and checking.

Indoor Installation (bulkhead or ceiling)

- Locate the unit away from GPS and NNSS receivers, radio equipment, etc. to avoid mutual interference.
- The lead-in wire should be as near to the unit as possible.
- Select a place where the unit can be easily maintained, but where it will not interfere with crew or passengers.
- Select a location where the earth connection can be made at the front of the unit.

Mounting (Refer to page D-4.)

Mounting Dimensions

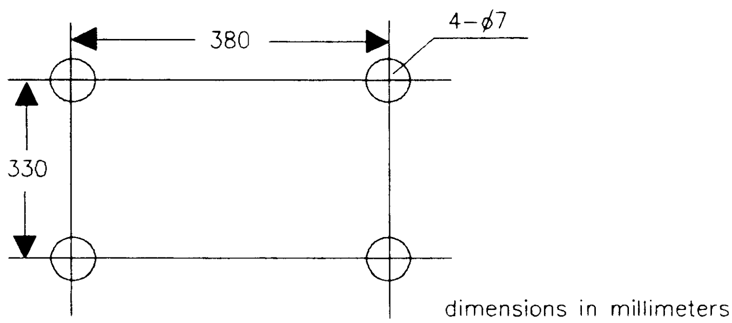


Fig. 3-20 Mounting Dimensions of the Antenna Coupler

Anti-Moisture Measure

Ventilation must be provided to prevent moisture from being drawn into the enclosure during atmospheric pressure changes and to allow trapped humid air to escape. Two vent holes are provided on the unit (see Figure 3-21), one at the rear and one at the bottom. A vent tube is mounted at the position Ⓐ shown below. For horizontal installation, remove the vent tube from Ⓐ and fix it to Ⓑ . Cover Ⓐ with the blind seal (supplied), from inside the coupler. For ceiling mount, make a hole (ϕ8.5) on the front panel and mount the vent tube. These measures should be done before mounting the unit.

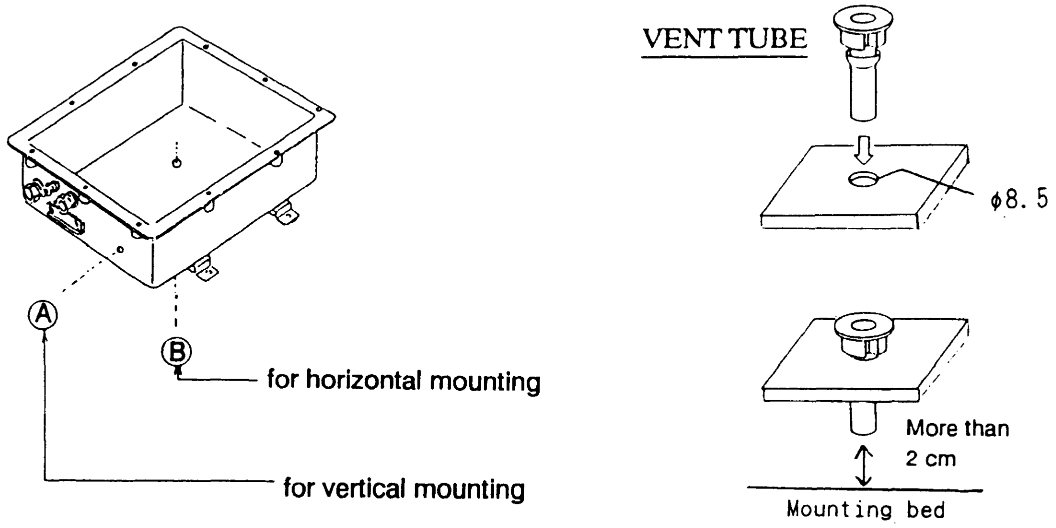


Fig. 3-21 Location of Vent Holes in the Antenna Coupler

Outdoor Installation

Fix the Antenna Coupler to a bulkhead of the bridge, mast, handrail, etc. For mounting on the mast, select a location which is within the total length of the antenna. Weld suitable mounting fixtures (local supply) to the mast and bolt the coupler there.

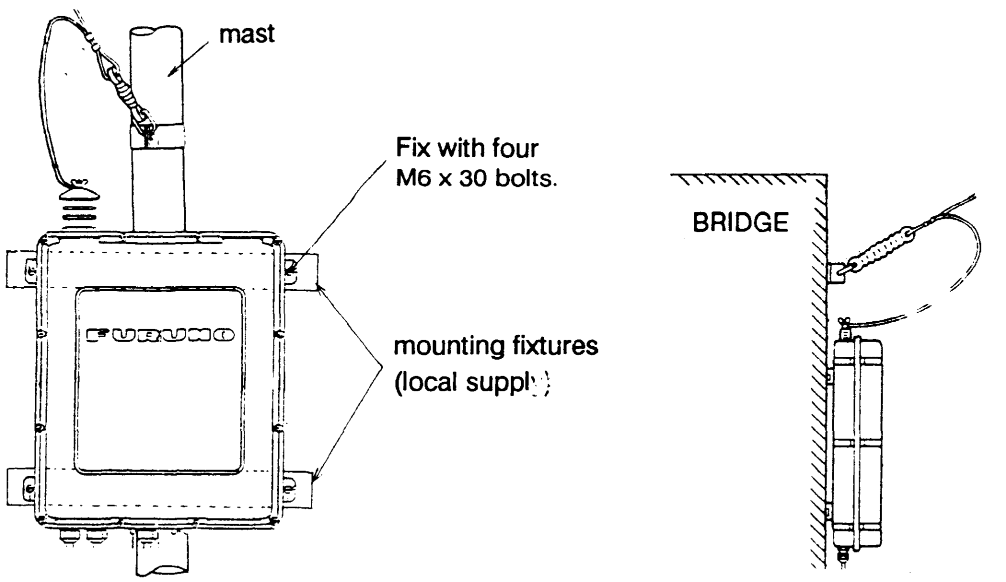


Fig. 3-22 Installing the Antenna Coupler Outdoors

Indoor Installation

Fix the Antenna Coupler to a bulkhead on the bridge, selecting a location where the distance between the lead-in insulator and the coupler is as short as possible.

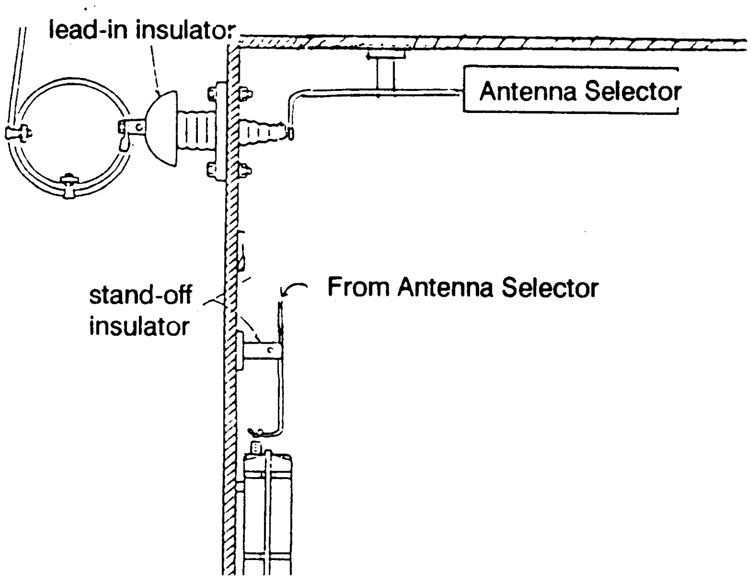


Fig. 3-23 Mounting the Coupler Indoors

Wiring

Three cables are terminated at the Antenna Coupler: the five pair cable and coaxial cable from the Transceiver Unit and the antenna wire. For the connection between the antenna wire and Antenna Coupler, use an insulator so as not to put stress on the connector at the insulator of the Antenna Coupler. For outdoor installation, the use of armored cables is recommended for avoidance of damage of cables.

1. Dismount the front cover of the Antenna Coupler by loosening twelve fixing screws.

2. Locate the Coupler Board. Connect the coaxial cable to the TX ANT terminal on TB1, locating the shield inside the cable clamp to ground the cable.

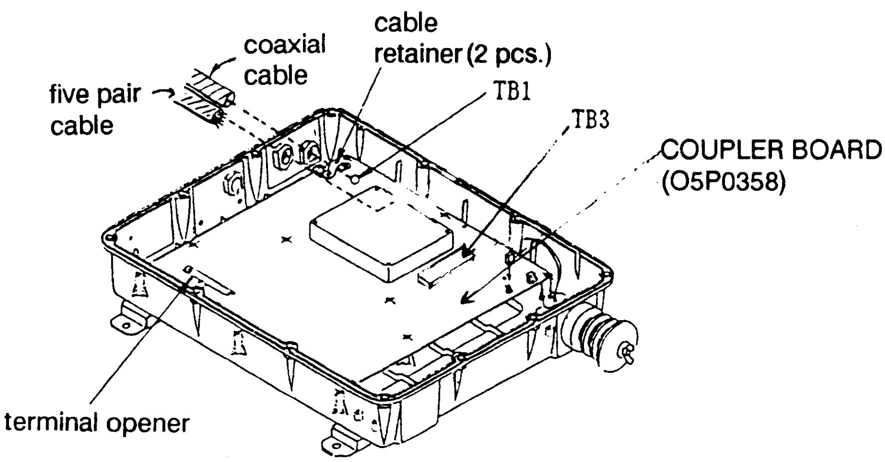


Fig. 3-24 Antenna Coupler, Front Cover Opened

3. Using the terminal opener, connect the five pair cable to TB3.

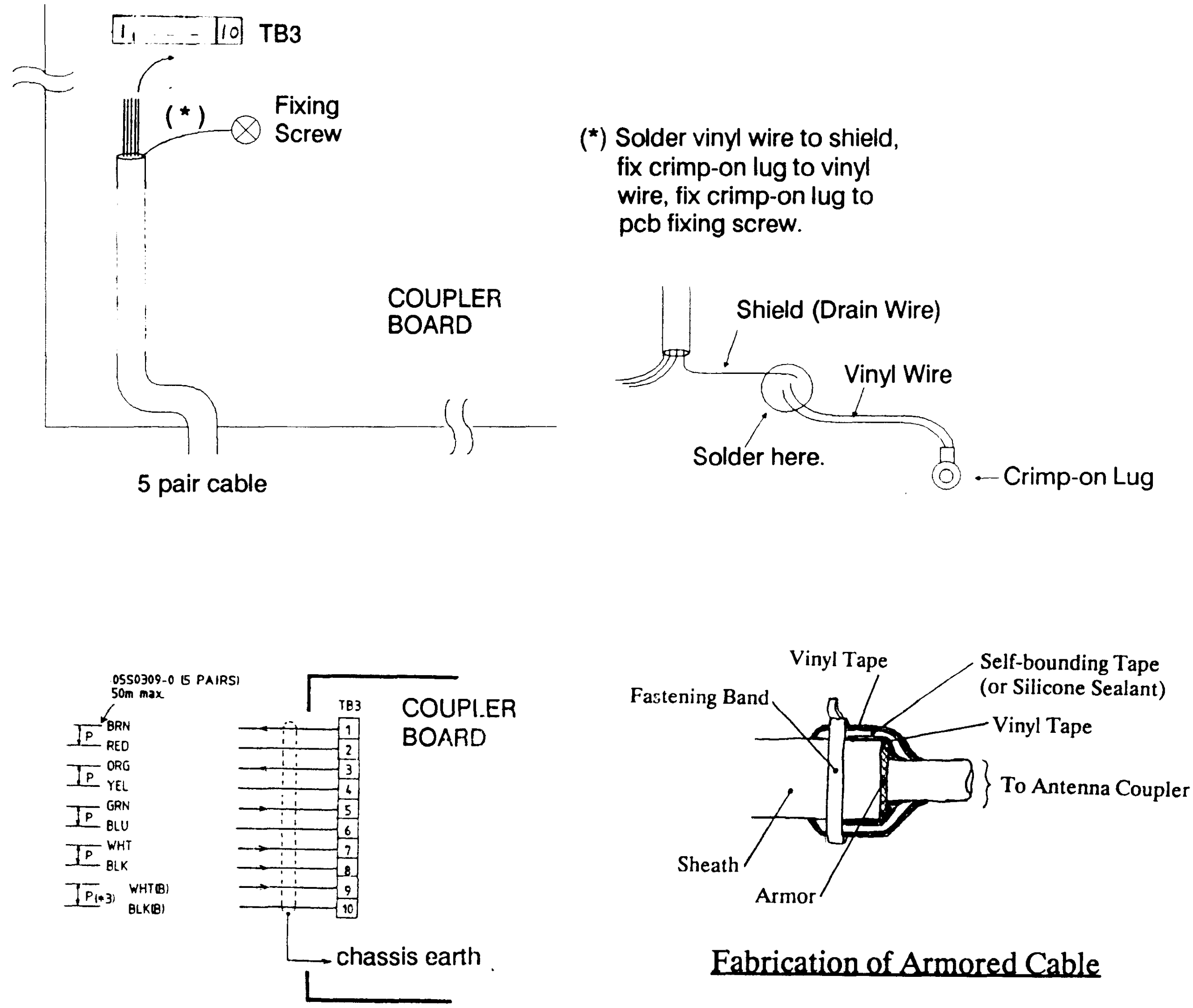


Fig. 3-25 Connections on the Coupler Board

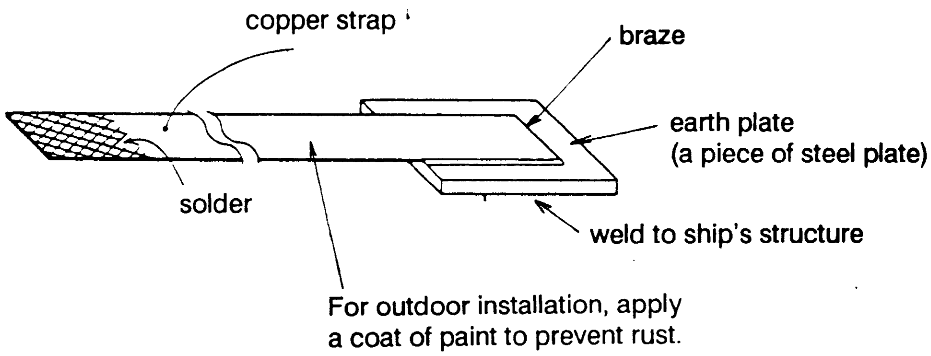
Ground Connection

As the ground connection of a transmitter is part of the total antenna system, it is of the utmost importance that the ground connection to the Antenna Coupler is constructed to have the lowest possible RF-impedance. Losses in the ground connection reduce communication distance.

> ⚠ **CAUTION**
>
> **Ground the equipment.**
>
> Ungrounded equipment can give off or receive electromagnetic interference or cause electrical shock.

For vessels constructed of conducting materials, run a copper strap of least 50 mm width (option) between the ground terminal at the base of the Antenna Coupler and the ship's superstructure.

For vessels constructed of non-conducting materials, the width of the copper strap should be at least 100 mm.



Recommended Grounding Strap

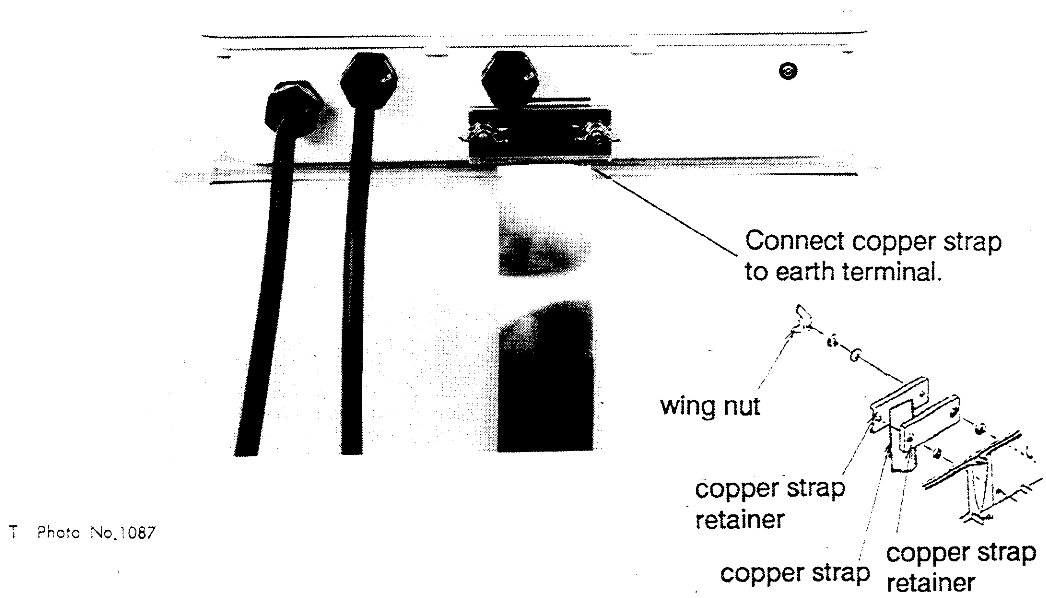


Fig. 3-26 Grounding the Antenna Coupler

MOUNTING THE RECTIFIER UNIT PR-850A(option)

Mounting Considerations

- Select a location which provides adequate ventilation.
- The location should be clean and dry.
- The mounting location must be able to support the weight of the unit (35 kg) under the continued conditions of vibration normally encountered aboard the vessel.

Mounting (Refer to page D-5.)

The mounting dimensions of the Rectifier Unit are shown in Fig. 3-27.

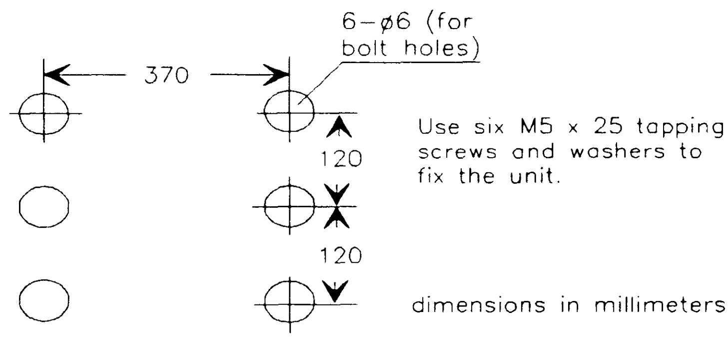


Fig. 3-27 Mounting Dimensions of the Rectifier Unit

Wiring

Connect AC power cables to the input terminal on the front panel and 24VDC power cables to another input terminal on the rear panel, using crimp-on lugs. For GMDSS vessels, 24VDC power must be supplied through the radio battery. The output terminal on rear panel outputs 24VDC power. Run an earth wire between the earth terminal on the unit and the ship's superstructure or grounding bus. For connections to output terminals, bend crimp-on lugs so they do not contact the terminal board cover.

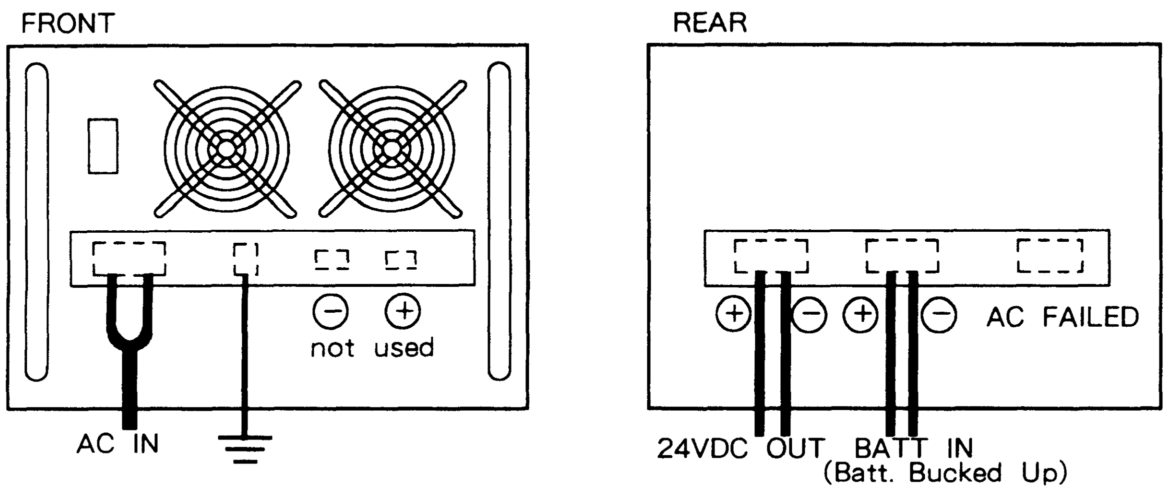


Fig. 3-28 Connections on the Rectifier Unit

Selection of Input Voltage

The input voltage is adjustable for 100/110/120/200/220/240 VAC, and is factory-set for 220 VAC. To select other input voltages, open the top cover and change the wiring according to the figure below. After changing the input voltage, correct the front panel sticker accordingly.

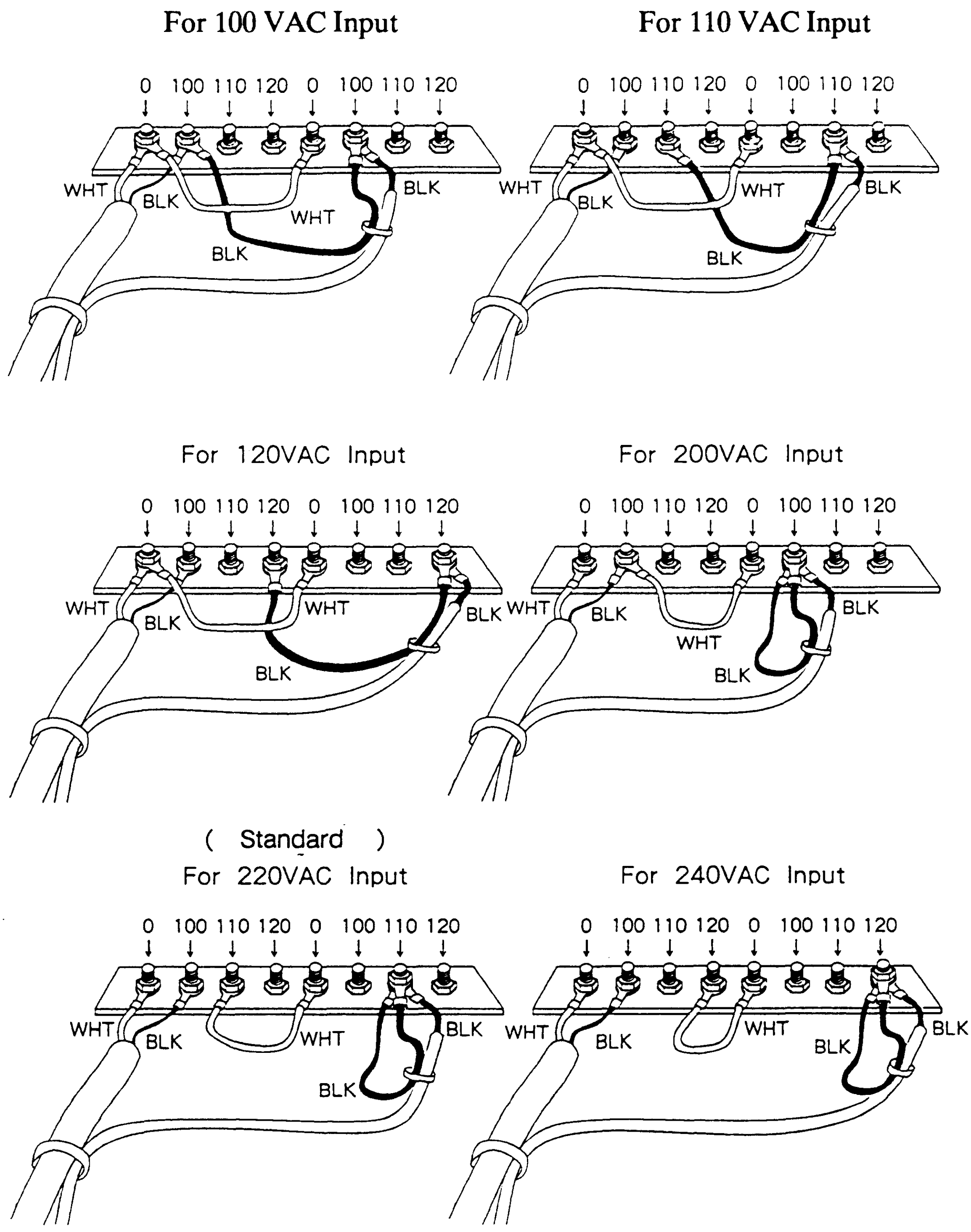


Fig. 3-29 Selection of Input Voltage on the Rectifier Unit

POST INSTALLATION CHECKS AND ADJUSTMENTS

Visual Checks

Before turning the Control Unit on, visually check each unit for proper installation.

Antenna Coupler

1) Is the unit grounded?
2) Is the length of the ground wire as short as possible?
3) Is the vent hole open? (A vent tube is mounted at delivery.)
4) Are all wirings made correctly?

Transceiver Unit

1) Is the cable entry sealed with putty or similar material?
2) Are input power terminals TB1/TB2 covered with dust caps?
3) Are all connections on terminal boards in good order?

Control Unit

1) Are flat cables connected? Stoppers returned to normal position?
2) Are connections on terminal boards in good order?

Input Voltage Check

Open the front cover and front door of the Transceiver Unit to access the breaker (60A). Confirm that the input voltage at TB1/TB2 is 24/32 VDC, +30%, -10%. Turn the breaker on.

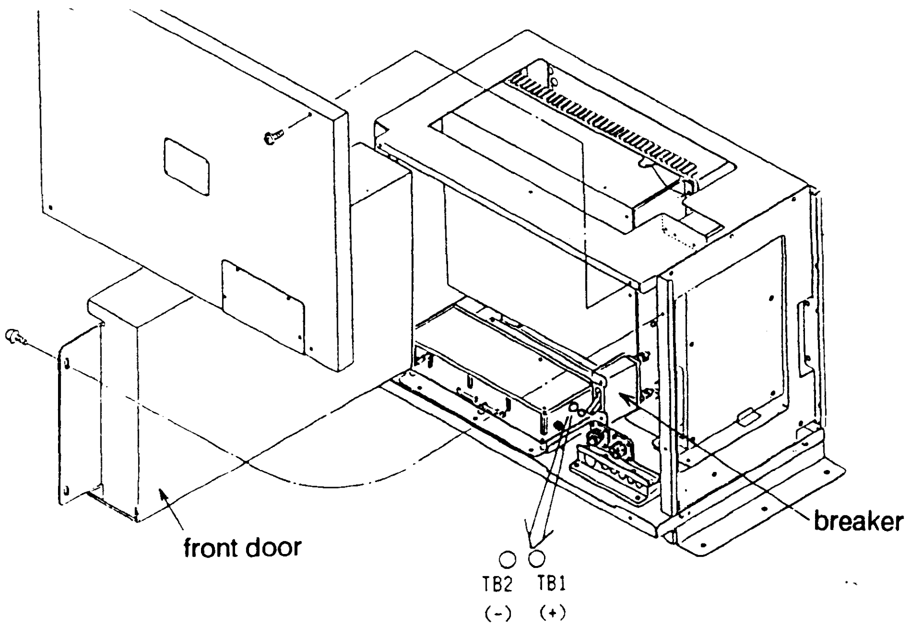


Fig. 3-30 Location of Breaker Inside the Transceiver Unit

Control Unit Check

1) Conduct the self-tests described on page 2-3.
2) Check the unit for proper operation.

Receiver Check

Control Settings:

Speaker:	ON	Squelch	OFF
AGC:	SLOW	Sensitivity:	Max.

Confirm that a signal can be received on each band. If there is noise or a signal is weak, check the antenna lead-in section, coaxial cable connections on the Transceiver Unit and ground connections.

Transmitter Check

1. Select a TX frequency then press the PTT switch. Confirm that the antenna is tuned within 15 seconds.

2. Press and release the **TX TUNE** key several times, confirming that the antenna is tuned each time (OK appears on the LCD) the key is released. If TX Tuning Error appears, recheck antenna length.

3. Communicate with the handset, confirming that antenna current (IA) changes with voice level.

4. For duplex communication, confirm that a transmit signal does not mask the receiving signal. You may reduce transmission noise by setting AGC time and noise blanker to "FAST" and "ON", respectively.

Operation Check

Refer to Chapter 1 to make the following checks.

1) Recall ITU channels
2) Store and recall user channels
3) Check scan and sweep functions for proper operation
4) Set timer and wake-up timer

Adjustment of Noise Blanker Level

The threshold level of the noise blanker (NB) is adjusted by the potentiometer R76 (NB LEVEL) on the RX board (05P0348) in the Transceiver Unit.

The NB becomes sensitive when the potentiometer is turned counterclockwise; however, do not turn excessively to prevent signal distortion. The potentiometer is so adjusted that noise is effectively decreased with minimum signal distortion.

For reference; Potentiometer setting
Factory set -------------------------- Mid. point (12 o'clock)
Signal will be distorted at -------- 10 to 11 o'clock

Manual 2182kHz Tuning Preset

International regulations require that 2182kHz be tunable both automatically and manually. The setup to enable manual tuning, in the event the antenna tuner system fails, is made with the DIP switches in the Antenna Coupler.

1. Remove the top cover of the Antenna Coupler. Set toggle switch S1 (Coupler Board) to AUTO.

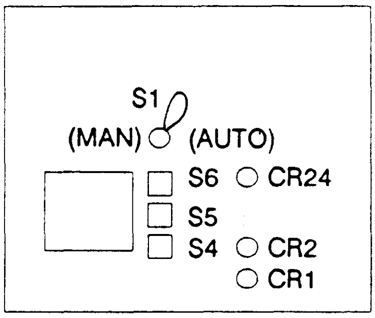


Fig. 3-31 AUTO/MANUAL 2182kHz Switch on the Coupler Board

2. Turn the Control Unit on.

3. Press the **2182** key.

4. Press the **TX TUNE** key. TX TUNING appears on the LCD. OK appears when tuning is completed. Record the status (on or off) of LEDs CR1-CR23.

5. Set S1 to MAN 2182.

6. Set DIP Switches S4 thru S6 according to LED status recorded in step 4.

DIP Switch		LED
S4	#8	CR1
	7	CR2
	6	CR3
	5	CR4
	4	CR5
	3	CR6
	2	CR7
	1	CR8
S5	#8	CR9
	7	CR10
	6	CR11
	5	CR12
	4	CR13
	3	CR14
	2	CR15
	1	CR16
S6	#8	CR17
	7	CR18
	6	CR19
	5	CR20
	4	CR21
	3	CR22
	2	CR23

Be sure that S6 #1 is set to "OFF" any time.

7. Return S1 to AUTO, confirming that LEDs do not change. If different, repeat step 6.

8. Set S1 to MAN 2182 kHz.

9. Press the **CHECK METER** key on the Control Unit to display antenna current.

10. Making sure it is not silent time, communicate with the handset. Confirm that IA changes with voice level.

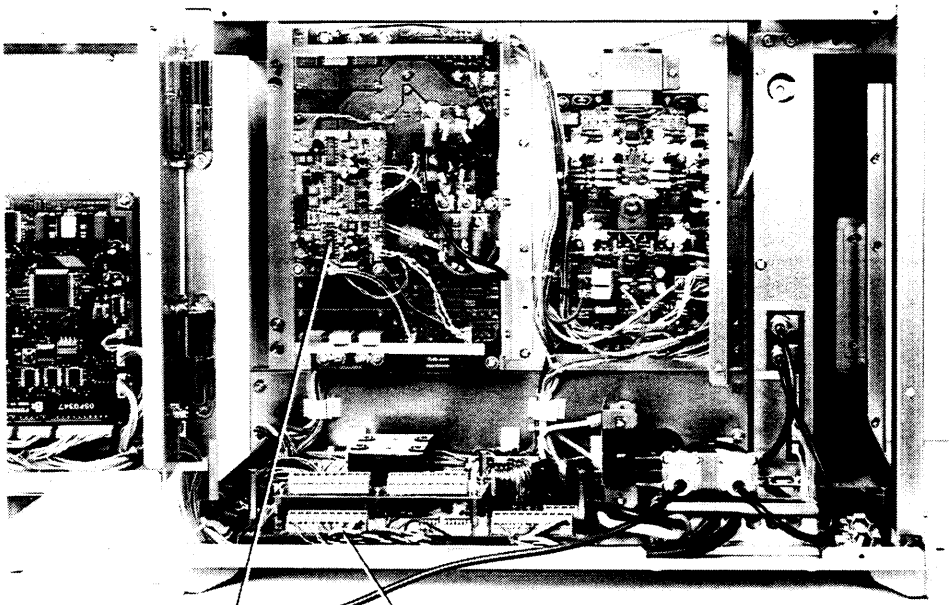
11. Set S1 to AUTO. Close the cover of the Antenna Coupler.

Note: Note that frequencies other than 2182 kHz also can be transmitted manually. Similar to the above procedure, record the status of LEDs CR1-CR23 during automatic tuning of an often-used frequency and set DIP Switches S4 to S6 according to LED status.

ALTERATION OF SUPPLY VOLTAGE SETTING

Change the jumper wire on the REG CONT Board and INTERFACE Board according to ship's mains (24 or 32 VDC).

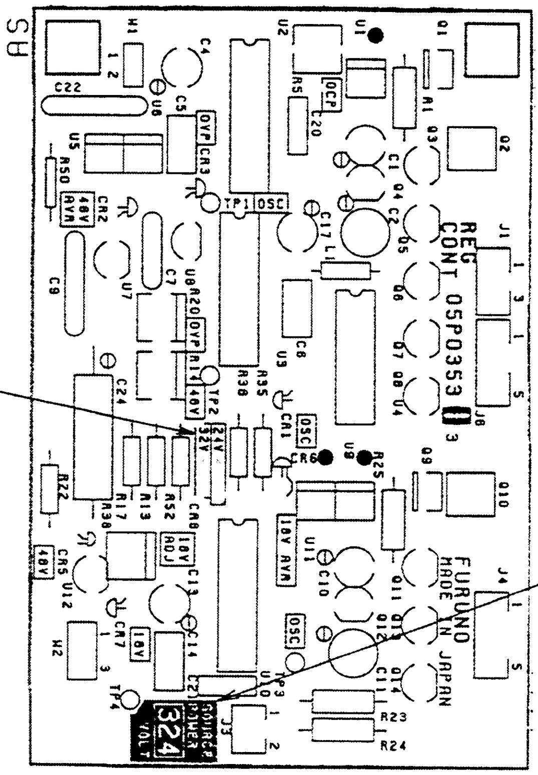
① Modification of REG CONT Board



INTERFACE Board

T Photo No.1107

REG CONT Board



Jumper Wire
24 VDC: open
32 VDC: short

Input power displayed here.

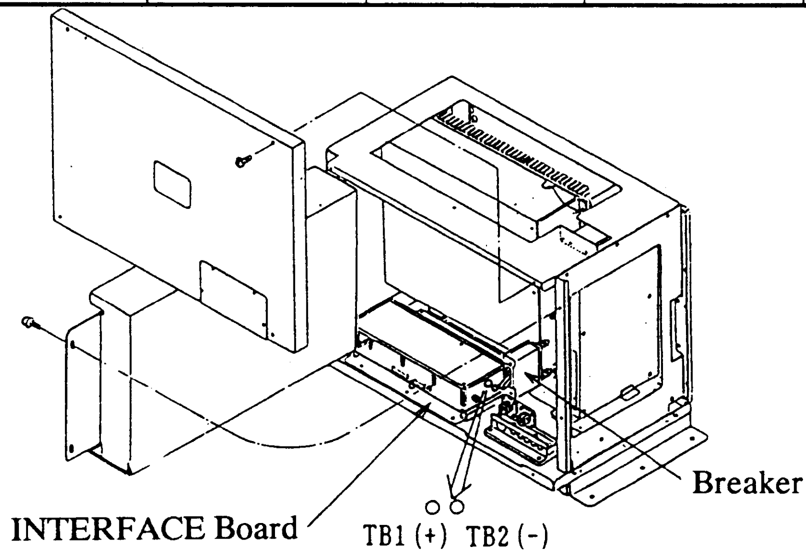
24 VDC: 3 2 4
32 VDC: 3 2 4

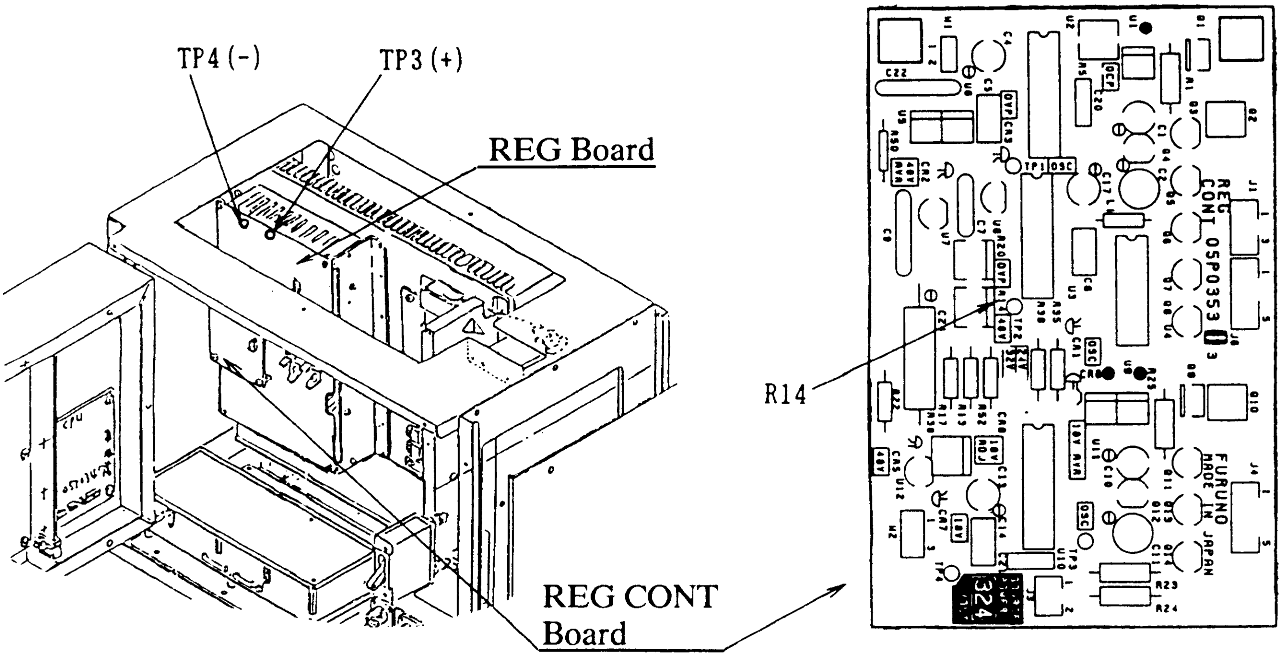
Black out a digit to show voltage.

Checking Voltage

Measure input voltage and the 48 V line under receiving condition. If the voltage of 48 V line is not within the rating shown in the table below, adjust it with R14 on the REG CONT Board.

Ship's Mains	Input Voltage		48 V Line Voltage		
	Measuring Point	Rating	Measuring Point	Rating	Adjuster
24VDC	INTERFACE Board	21.6 – 31.2 V	REG Board	45 V (± 0.1 V) (at 24V supply)	REG CONT Board
32VDC	TB1 (+) TB2 (–)	28.8 – 41.6 V	TP3 (+) TP4 (–)	44 V (± 0.1 V) (at 32V supply)	R14

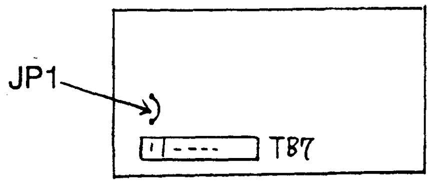




② Modification of INTERFACE Board

(Overvoltage Setting)

Ship's Mains	Jumper Setting (JP1)
24 VDC	Short
32 VDC	Open



After modification, overvoltage value is automatically set as follows.

Ship's Mains	Overvoltage value
24 VDC	34 VDC
32 VDC	44 VDC

4. INSTALLATION OF OPTIONAL EQUIPMENT

DUMMY LOAD

A SOLAS dummy load (10 ohm + 250 pF. Continuous transmission for less than 1 minute at 200W average, MF only) is optionally available.

Parts

Name	Type	Code No.
Dummy Load (pcb assy.)	OP05-34-H	000-056-876

Procedure

1. Loosen the 12 screws securing the top cover of the Antenna Coupler.

2. Install the dummy load pcb assy. as shown in Fig. 4-1.

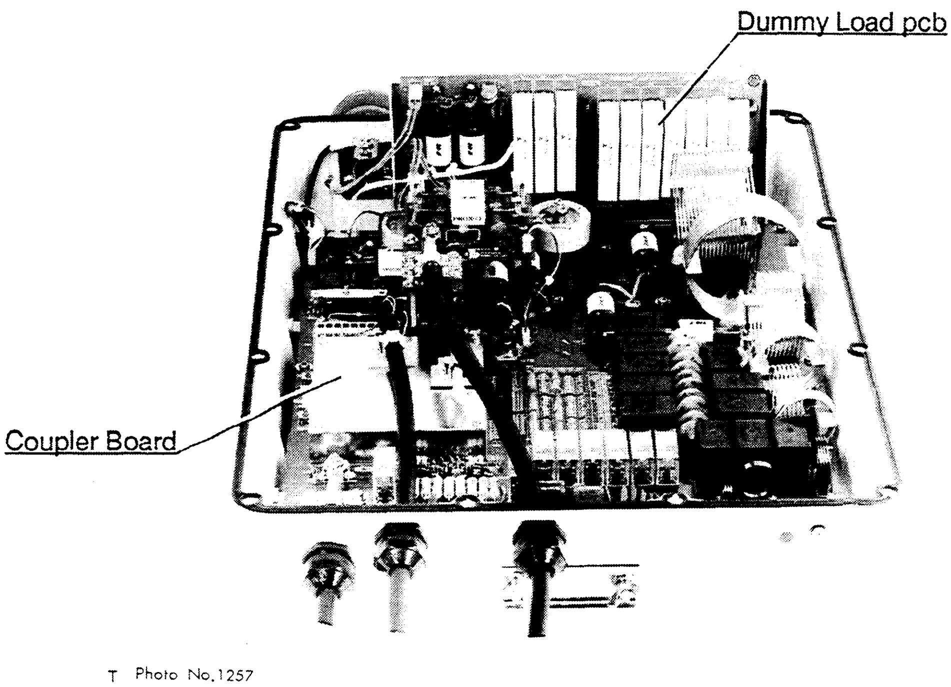


Fig. 4-1 Antenna Coupler, Top Cover Removed

3. Using the connectors supplied (2P/3P/4P), electrically connect the Dummy Load Board (05P0360) to the Coupler Board (05P0358) as shown in Fig. 4-2.

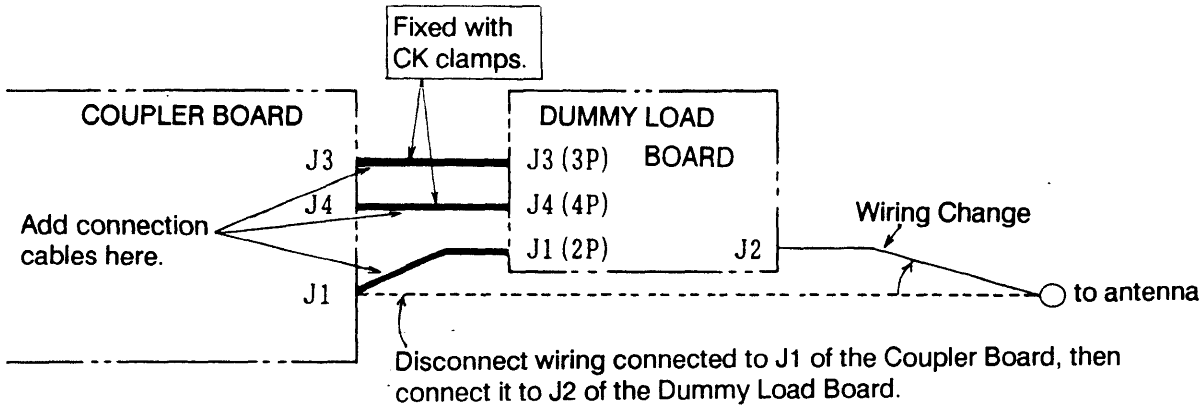
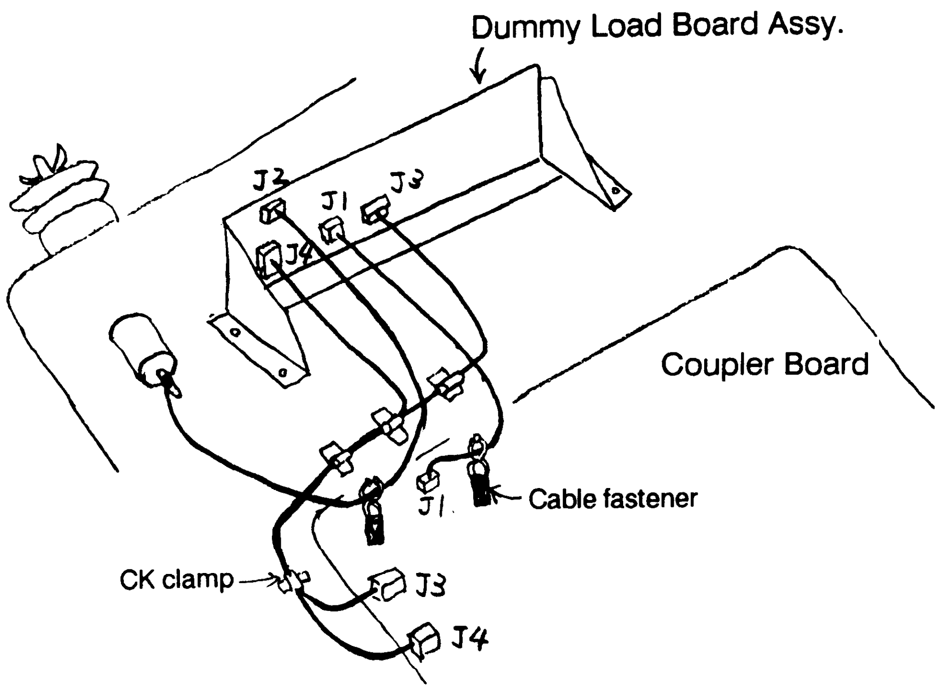


Fig. 4-2 Wiring for Installation of Dummy Load

4. To prevent leaks on the high voltage, separate each cable as far as possible by passing each through CK clamps and cable fasteners as shown below.



5. Change the specifications referring to page 1-17. (STO 9923)

ANTENNA BK RELAY

When the frequencies of an MF band TX and RX frequency pair are dissimilar, a practice common in Europe, loss of RX signal may result because RX signal passes through the tuning circuit, since it is adjusted for the TX frequency. Loss of RX signal may also occur when switching to another frequency band, since the tuning circuit remains tuned to the previous band. (The PTT switch or TX TUNE key must be pressed to tune the antenna.) Accordingly, if the unit is used mostly for receiving, install a Antenna BK Relay in the Antenna Coupler to prevent loss of RX signal sensitivity. With the Antenna BK relay installed, a receive signal is fed directly to the Transceiver Unit, bypassing the tuning circuit. The connection between the Antenna Coupler and the Transceiver Unit is made with a coaxial cable. Use coaxial cable type RG-8A/U or the equivalent.

Parts

Name	Type	Code No.
Antenna BK Relay (pcb)	OP05-35-H	000-056-878
Coaxial Cable	RG-8A/U (lengths in multiples of 10 m, max. 50 m)	000-106-052 (10 m) : 000-106-056 (50 m)

Procedure

1. Open the Antenna Coupler. Install the Antenna BK Relay as shown in Fig. 4-4.

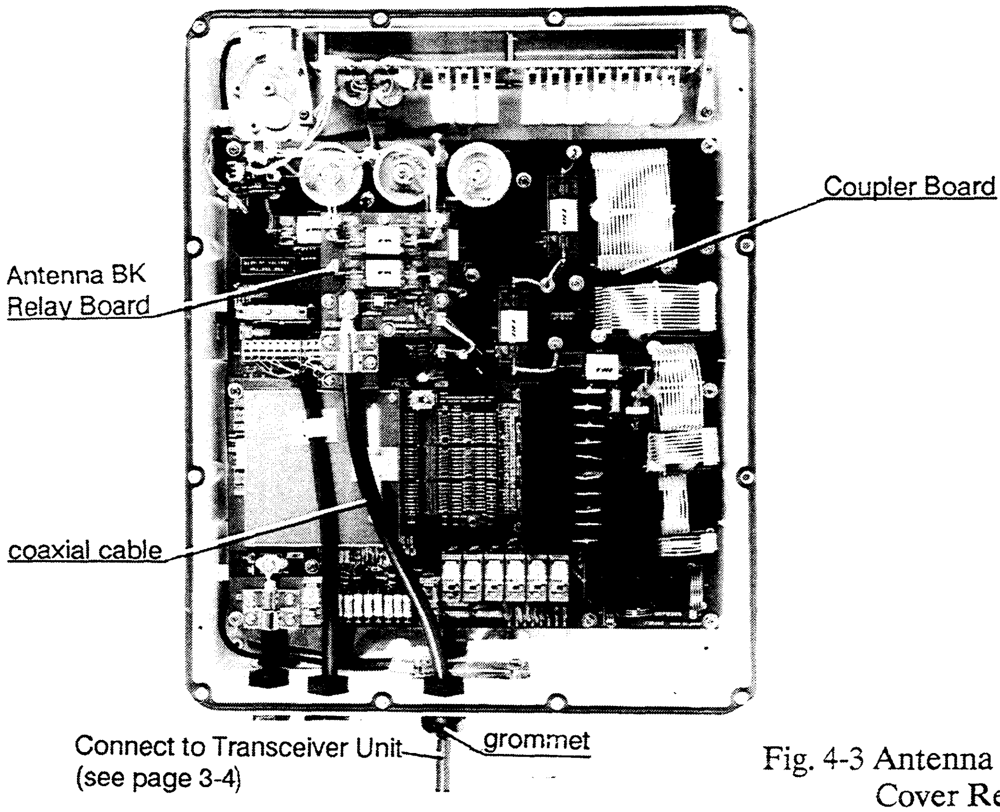


Fig. 4-3 Antenna Coupler, Cover Removed

T Photo No.1258

2. Remove the waterproofing material from the grommet on the Antenna Coupler. Pass the coaxial cable through the grommet and connect it to the Antenna BK Relay Board. Connect the other end of the cable to the Transceiver Unit, referring to Fig. 3-6 on page 3-4.

3. Connect the Antenna BK Relay Board to the Coupler Board, using the connectors (2P/3P) supplied.

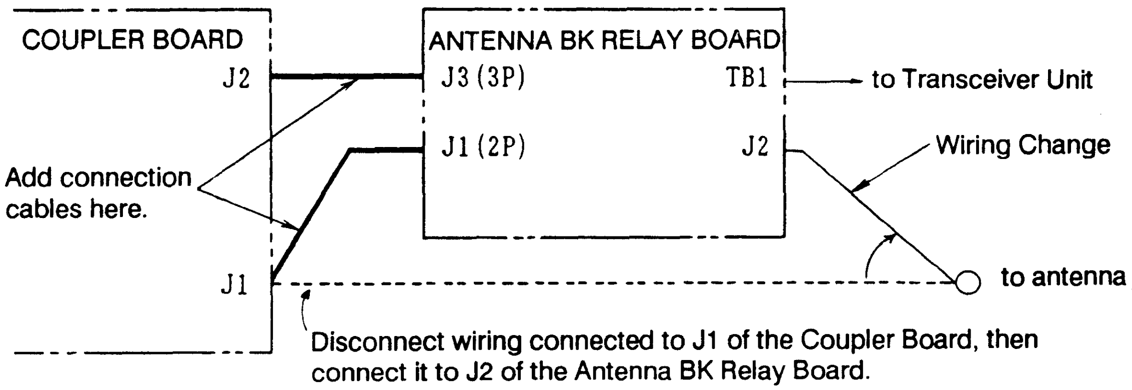
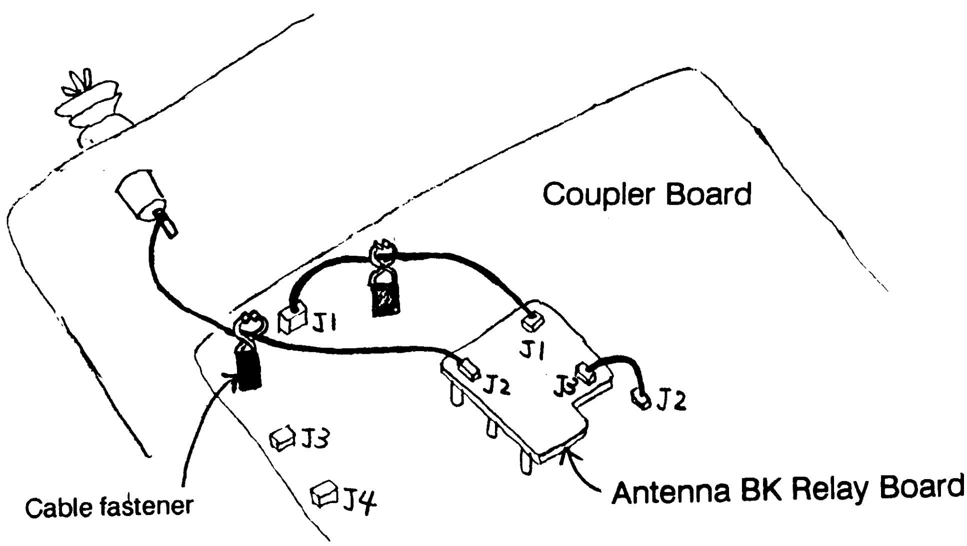


Fig. 4-4 Wiring for Installation of Antenna BK Relay

Note: Be sure to pass the wire from J2 of the Antenna BK Relay Board through a Cable fastener on the Coupler Board.



DUMMY LOAD & ANTENNA BK RELAY

If the dummy load and antenna BK relay are to be installed together the wiring required is different than for separate installation.

Connect the Coupler Board, Antenna BK Relay Board and Dummy Load Board as shown in Fig. 4-5.

Parts

Name	Type	Code No.
Dummy Load	OP05-34-H	000-056-876
Antenna BK Relay	OP05-35-H	000-056-878
Coaxial Cable	RG-8A/U or equivalent (max. length 50 m)	

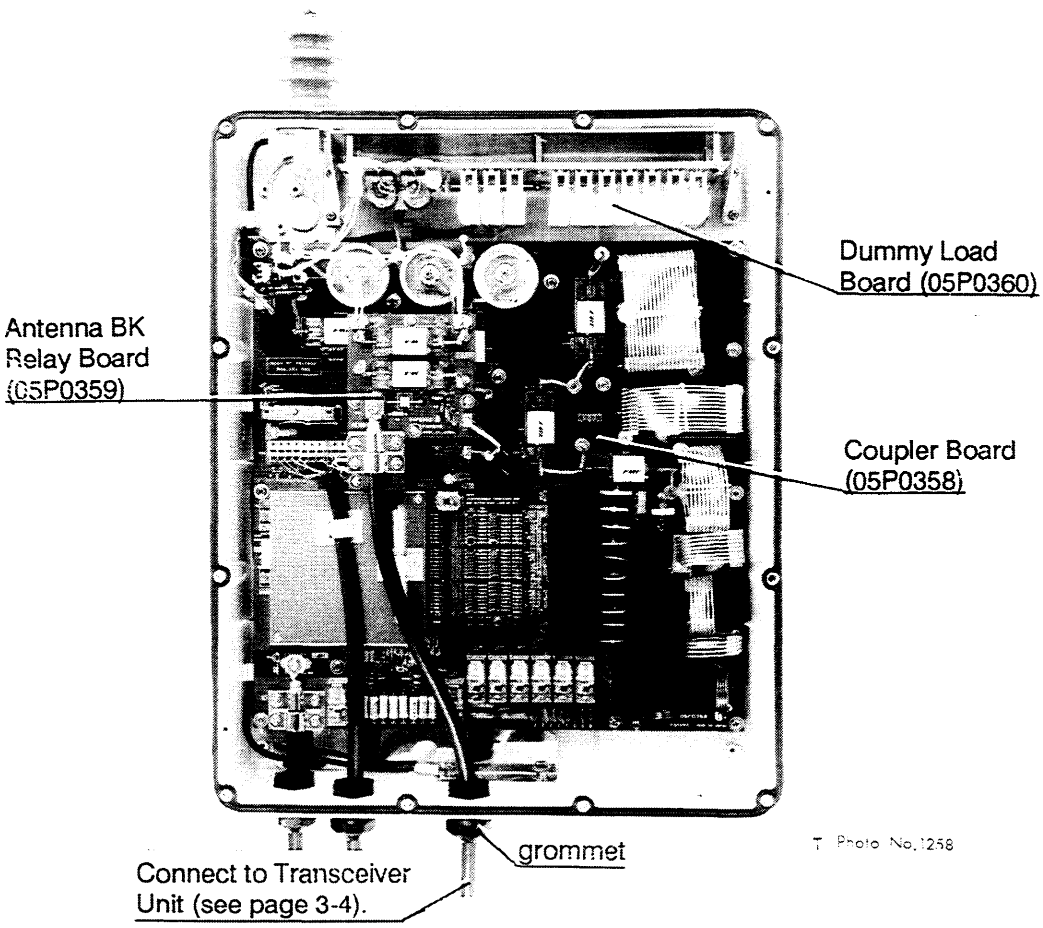


Fig. 4-5 Antenna Coupler, Inside View

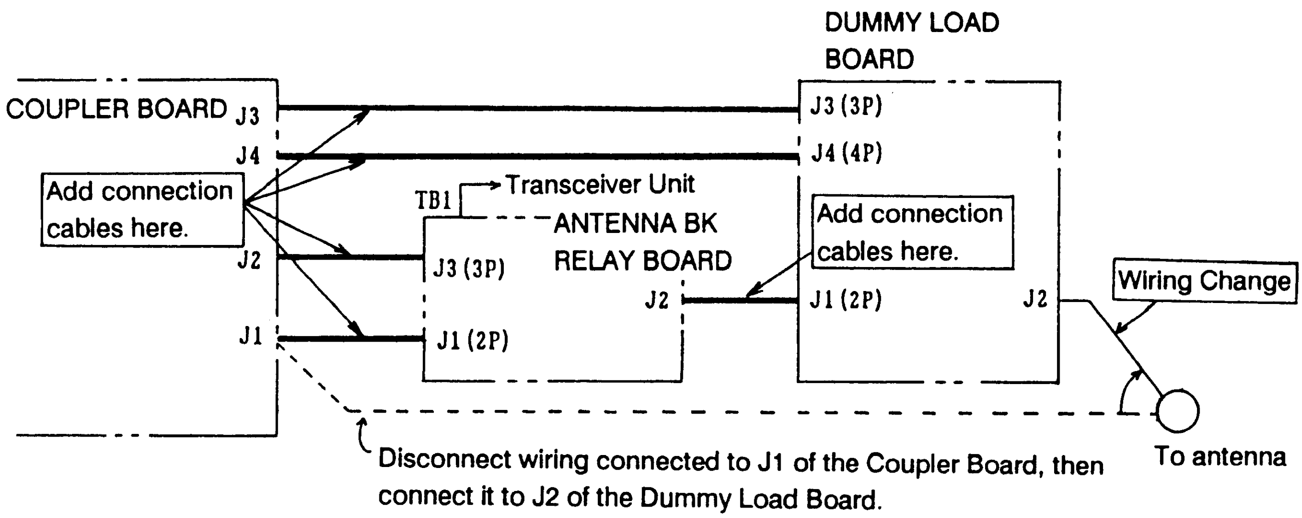
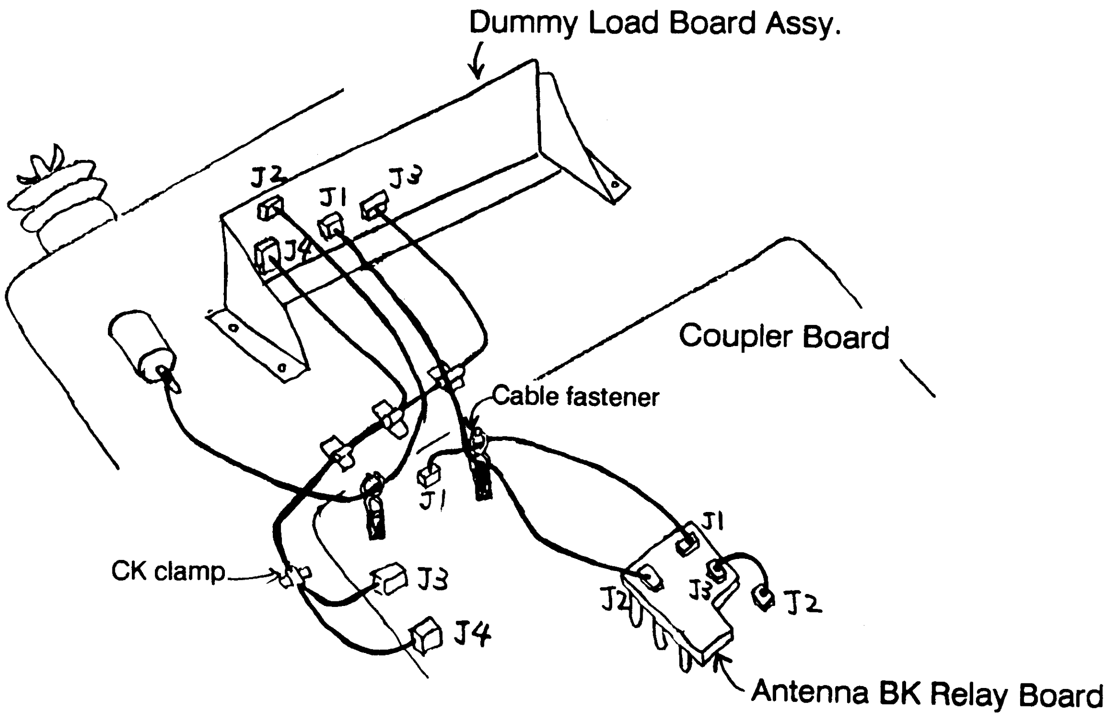


Fig. 4-6 Wiring for Installation of BK and Dummy Load

Note 1. To prevent leaks on the high voltage, separate each cable as far as possible by passing each through *CK clamps and Cable fasteners* *as shown below.*



Note 2. Change the specifications referring to page 1-17 (STO 9923).

#2 CONTROL UNIT

A #2 Control Unit may be installed, and priority may be assigned to #1 or #2 control unit. (Refer to page 1-17.) Note that the mounting location must be within 50 m of the Transceiver Unit.

Parts

Name	Type	Code No.
#2 Control Unit	FS-5000C-OP	000-056-766
Control Unit SW Board	OP05-33	005-925-900
Installation Materials (incl. five pair cable)	CP05-03780 (10 m) CP05-03781 (20 m) CP05-03782 (30 m) CP05-03783 (40 m) CP05-03784 (50 m)	000-056-755 000-056-756 000-056-757 000-056-758 000-056-759

Procedure

1. Install the Control Unit SW Board (05P0368) in the Transceiver Unit.

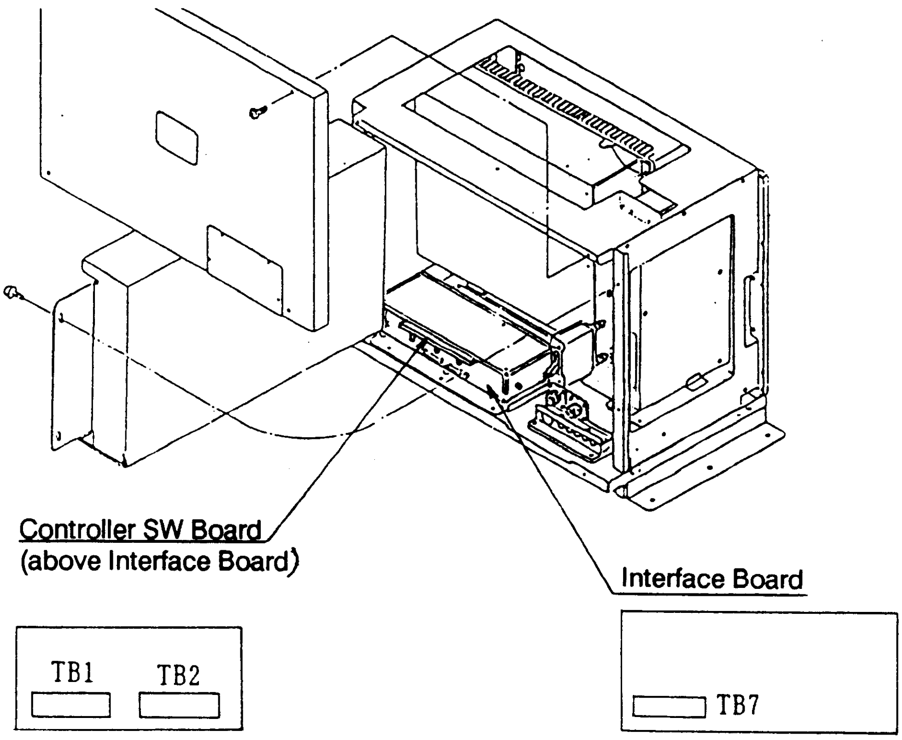


Fig. 4-7 Transceiver Unit, Front Door Opened

2. Connect the #2 Control Unit to terminal board TB2 on the Control Unit SW Board. Connect the #1 Control Unit to terminal board TB1.

If a #1 Control Unit is already installed, remove the wiring connected to TB7 on the Interface Board and connect the #1 Control Unit to TB1 on the Control Unit SW Board.

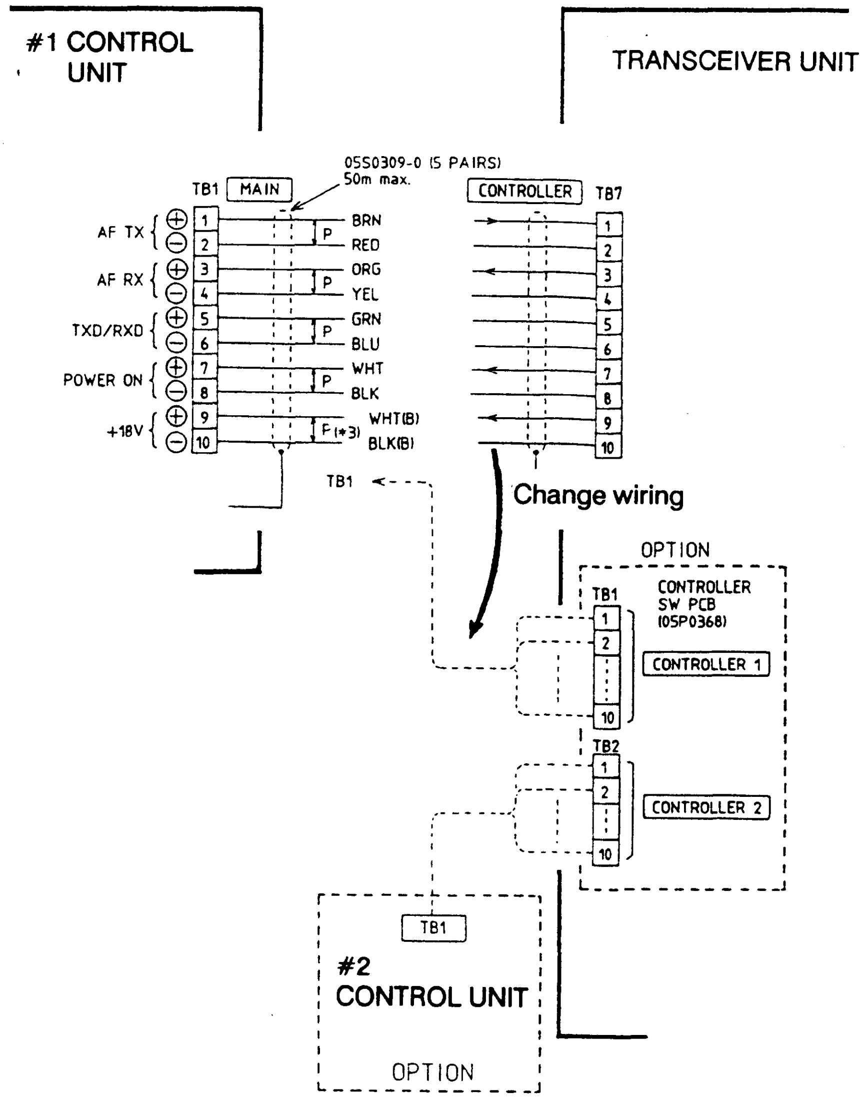


Fig. 4-8 Wiring for Installation of #2 Control Unit

5. CONNECTION OF EXTERNAL EQUIPMENT

BK CONNECTION

The BK of external equipment is connected to terminal board TB9 on the Interface Board of the Transceiver Unit. For connection of BK Interface (BK-300) with the FS-5000, refer to Installation manual of BK Interface (IMC-50830).

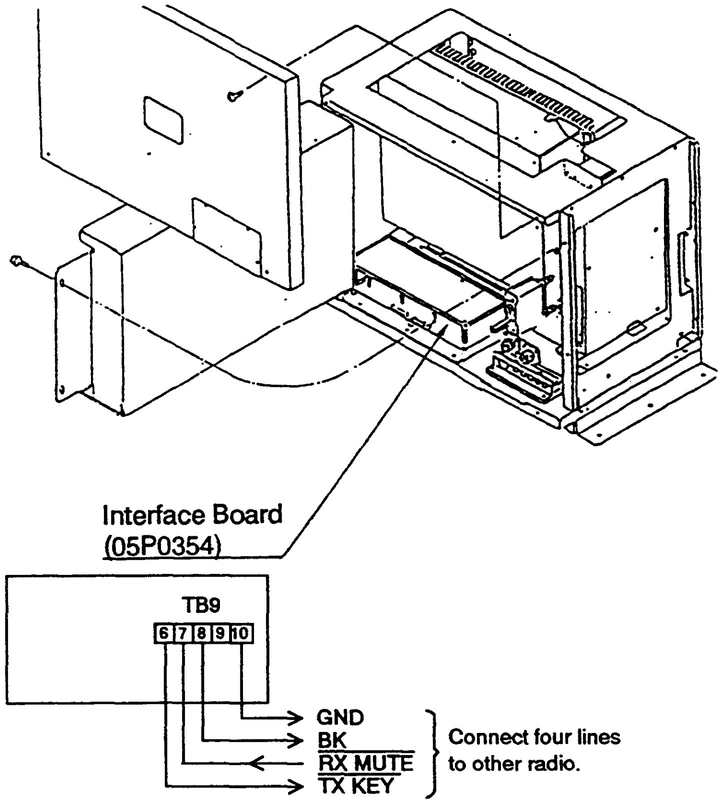


Fig. 5-1 Transceiver Unit, Showing Location of TB9

Terminal No.	Signal Name	Function	Objective
6	TX KEY	Gets low during transmission.	BK control for external receiver.
7	RX MUTE	RX is muted when this line gets low.	BK control from another transmitter.
8	BK	Output: +18 V or +24 V. (See note 1 on the next page.)	Power for relay of other radio.
9/10	GND	GND	0V

Note 1: The +18 V or +24 V can be supplied by changing the plug connection (J15/J16/J17) on the Interface Board as shown in Fig. 5-3. Note that the +24 V can not be used when the ground line (signal ground) of the other radio is connected to the chassis, since the ground line of TB9 #10 on the Interface Board is directry connected to the battery.

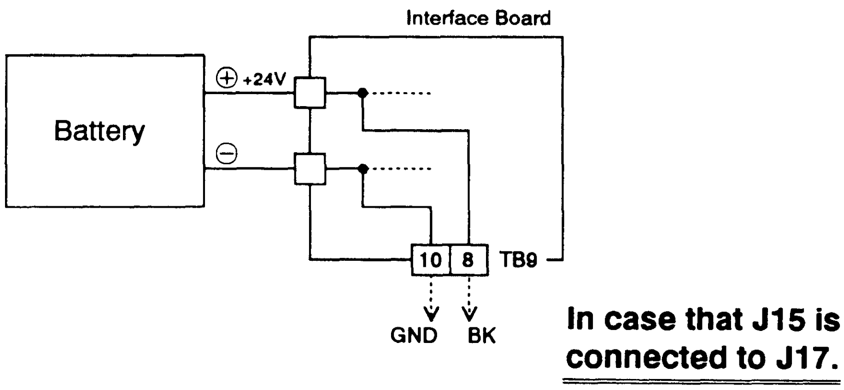


Fig. 5-2

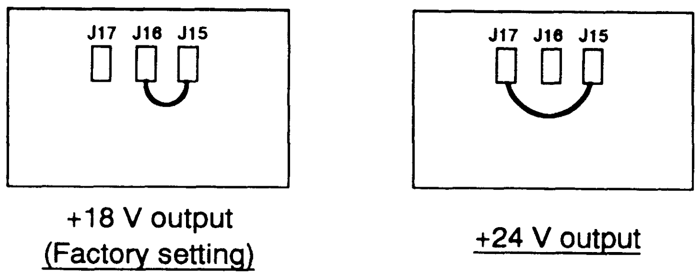


Fig. 5-3 Interface Board

Minus BK Line Control

Most Japanese specification radiotelephones made by Furuno are equipped with a mutual BK system (minus BK system). This type of BK enables mutual control of the BK of both own transmitter and another transmitter and receivers, with a dual conductor cable.

To enable the -BK control on this radiotelephone, put jumper as shown below. During duplex communications, the software of the FS-5000 is so made that the $\overline{\text{RX MUTE}}$ signal input is disregarded.

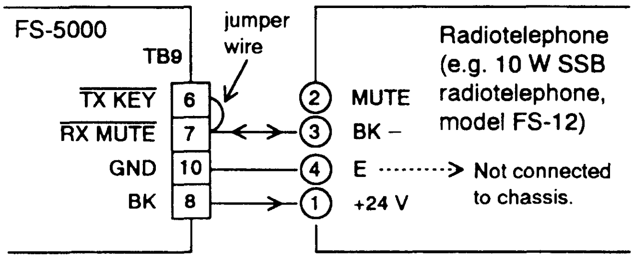


Fig. 5-4 Wiring Required to Enable -BK Line Control

CIF/NMEA CONNECTION

CIF or NMEA output from a navigation device is connected to terminal board TB4 on the AF Board of the Control Unit. Of this data the FS-5000 reads ship's L/L position and time data.

For the connection between the navigation device and the Control Unit, use a twisted-pair cable.

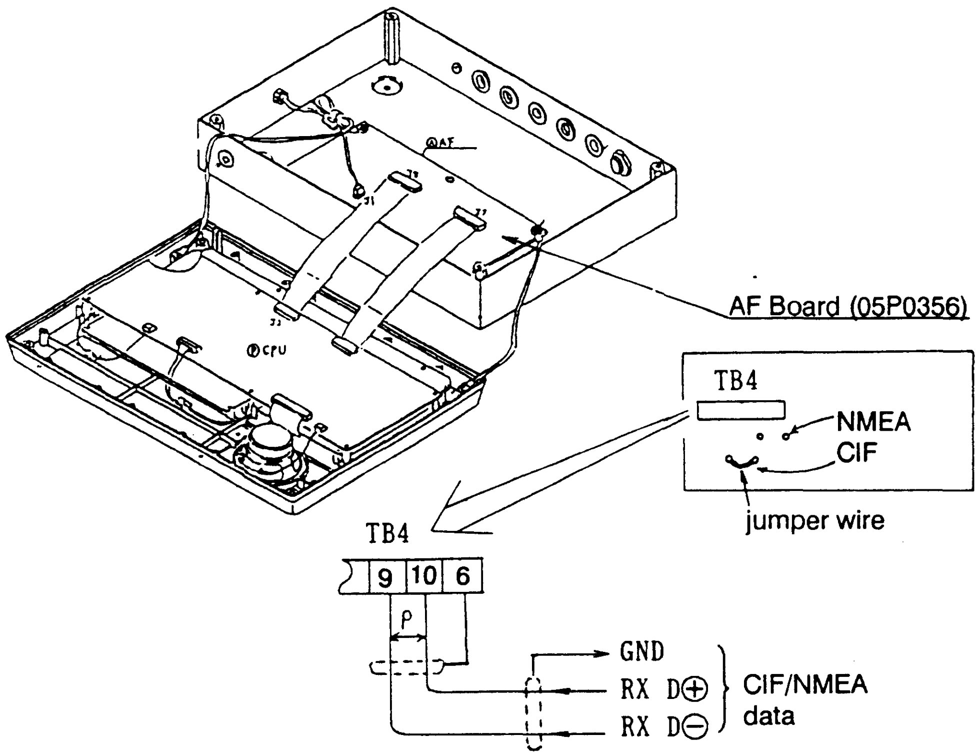


Fig. 5-5 Control Unit, Inside View

A jumper wire on the AF Board determines which data format is to be read, CIF or NMEA, and is set at the factory for CIF. For NMEA, connect the jumper to NMEA. Further, call up the system setting screen to confirm that the data input format selected is valid.

Procedure

1. Press **STO**, **9**, **9**, **3**, **3** and **ENT** in that order.

2. As the prompt indicates press **2** for CIF or **3** for NMEA and hit the **ENT** key.

NBDP TERMINAL, DSC TERMINAL, INTERSHIP FAX & SELCALL

The above devices are connected to terminal boards TB2 and TB3 on the AF Board of the Control Unit.

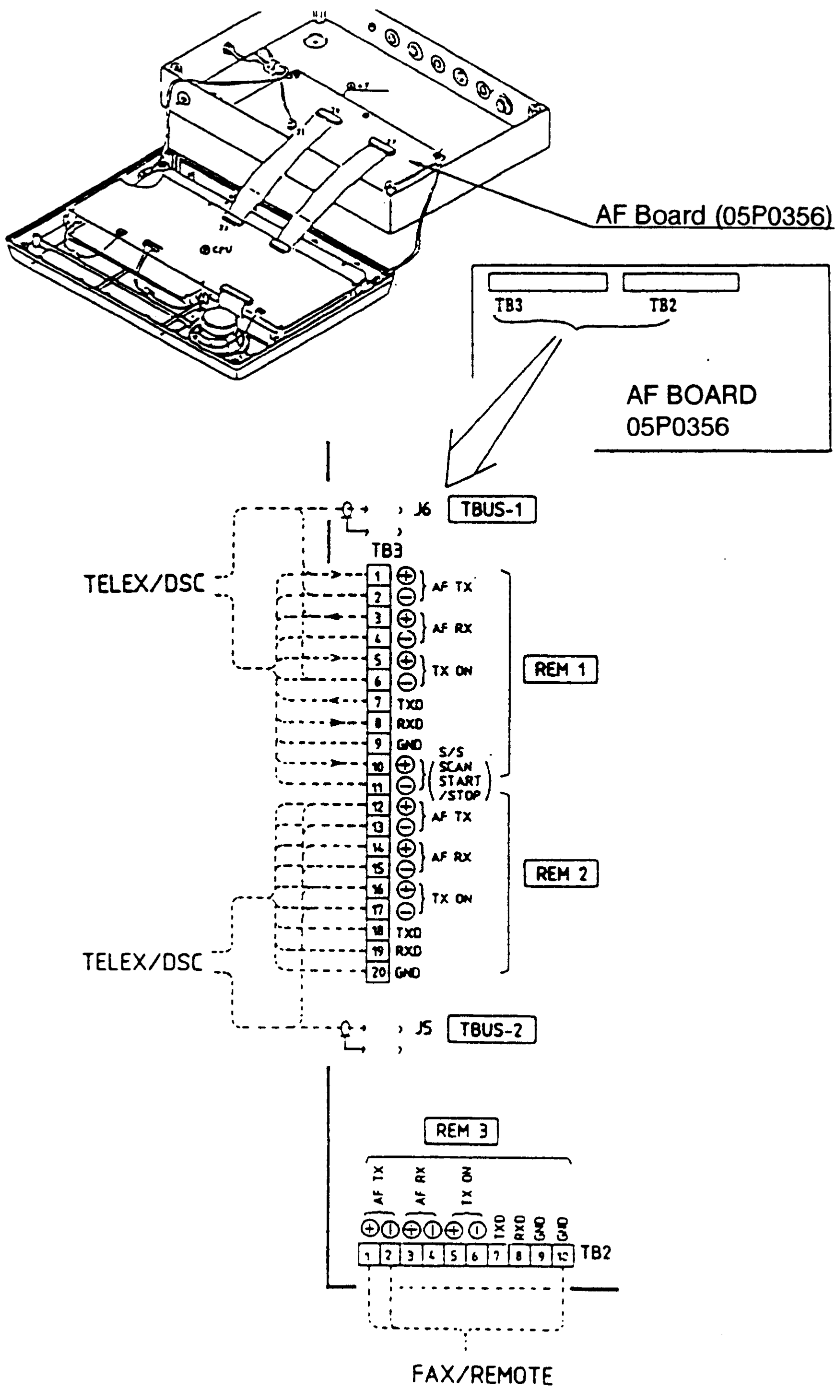
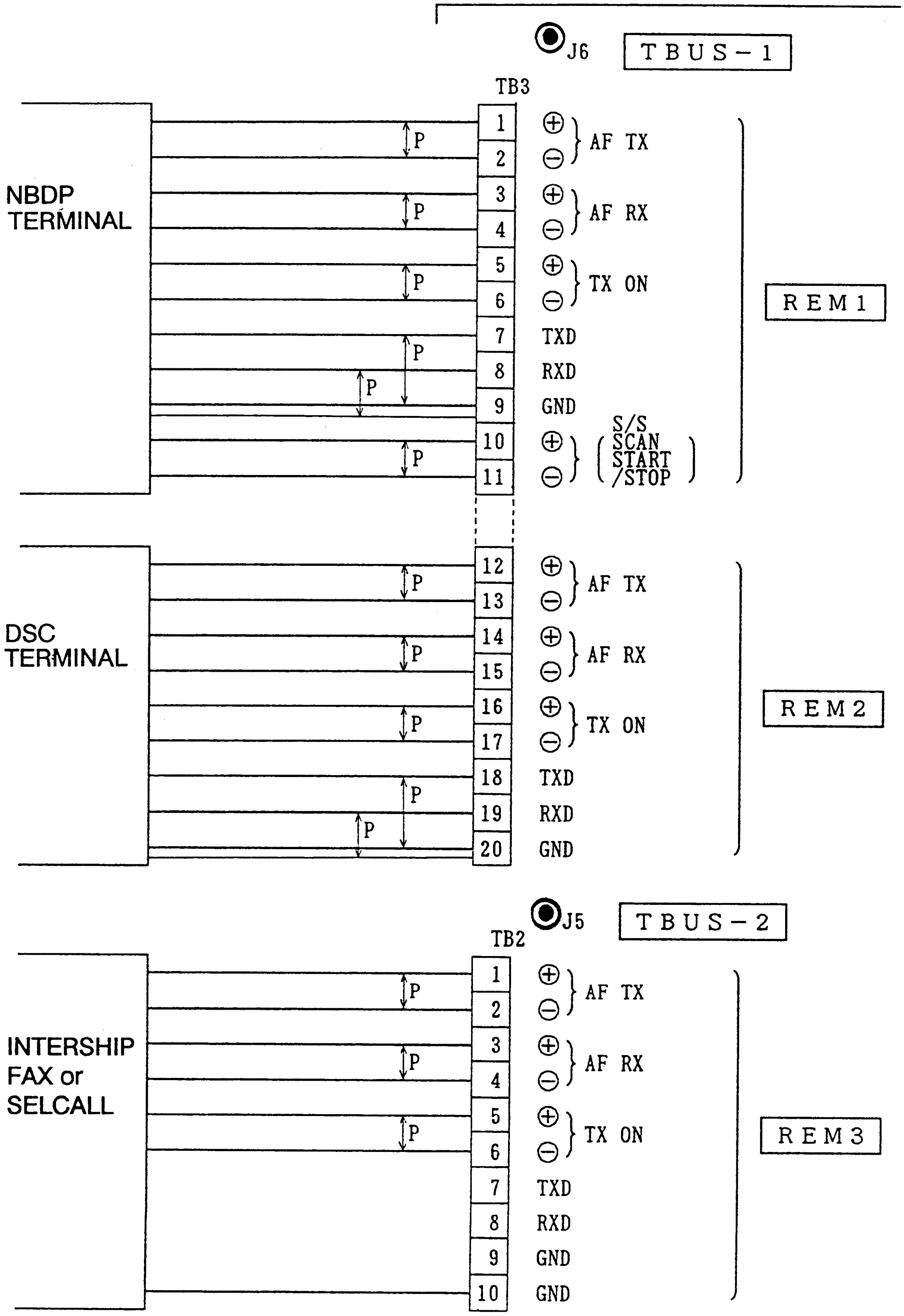


Fig. 5-6 Wiring for Connection of NBDP, DSC, FAX and SELCALL

For further details, refer to Operator's Manuals of NBDP Terminal and DSC Terminal.



These units may be connected to either REM1, REM2 or REM3. Namely, a fax for ship-to-ship communication can be connected to REM1.

However, for connection of Thrane & Thrane's DSC terminal or NBDP, use J6 (Thrane & Thrane's TBUS-1 bus line) or J5 (TBUS-2) instead of TXD, RXD and S/S.

The table below gives the name and meaning of each signal.

Signal Name	Meaning
AF TX	AF Input signal. 0 dBm/600 ohms
AF RX	AF Output signal. 0dBm/600 ohms
TX ON	BK signal from device connected.
TXD RXD	Data exchange between FS-5000 and device connected. RXD reads data from external equipment. TXD is for data output (for example, frequency, class of emission).
S/S	SCAN START/STOP signal. For units whose RXD line does not have a scan signal, this signal enables control of scanning by external equipment.

For connection of Furuno make DSC terminal or NBDP, see the operator's or installation manual.

NOTE:

1. For weather facsimile connection use the AF RX terminal.

2. To change the class of emission automatically when equipment connected to REM1, REM2 or REM3 is keyed, change the specifications as follows. (After keying, the class of emission is not restored to previous status.)

RCL, 9, 9, ☐, ☐, ENT

	Class of emission for;	0	1	2	3
9934	REM1	No change	SSB	AM	TELEX
9935	REM2	No change	SSB	AM	TELEX
9936	REM3	No change	SSB	AM	TELEX

(EX) Selcall is connected to REM1 ----- **RCL, 9, 9, 3, 4, ENT, 2, ENT**

3. If you wish to change the class of emission <u>only while the selcall is transmitted</u> and to restore it automatically to previous status after transmission, set the channel Nos. <u>9934 and 9937 to "0" (No change) and "2" (AM), respectively.</u>

	Temporary class of emission for;	0	1	2	3
9937	REM1	No change	SSB	AM	TELEX
9938	REM2	No change	SSB	AM	TELEX
9939	REM3	No change	SSB	AM	TELEX

Remarks on Connection to NBDP

Confirm that the BFO frequency of the FS-5000 is set to 1700Hz. (Refer to page 1-16.)

1. In case that a receiving antenna or ANT BK RELAY board is installed.

(1) System setting of FS-5000
50 ohm BK relay and TX delay time should be set to "ON" (fixed) and 10 ms, respectively.

STO 9982 **ENT** 1 **ENT**

(2) System setting of NBDP

① When DP-6 is connected ("Terminal" menu setting)

Slave Delay	:	5ms
BK Timing Pre tone	:	10ms
Post tone	:	0ms
Mute Timing Pre BK	:	0ms
Post BK	:	0ms

② When TT-1600 is connected

Receiver Post Mute	:	0×1.25ms
Transmitter Pre Key	:	8×1.25ms
Transmitter Post Key	:	0×1.25ms
Slave Delay	:	8×1.25ms

2. In case that 50 ohm BK relay is used.

(1) System setting of FS-5000
50 ohm BK relay and TX delay time should be set to "ON/OFF" and 30 ms, respectively.

STO 9982 **ENT** 0 **ENT**

① When DP-6 is connected

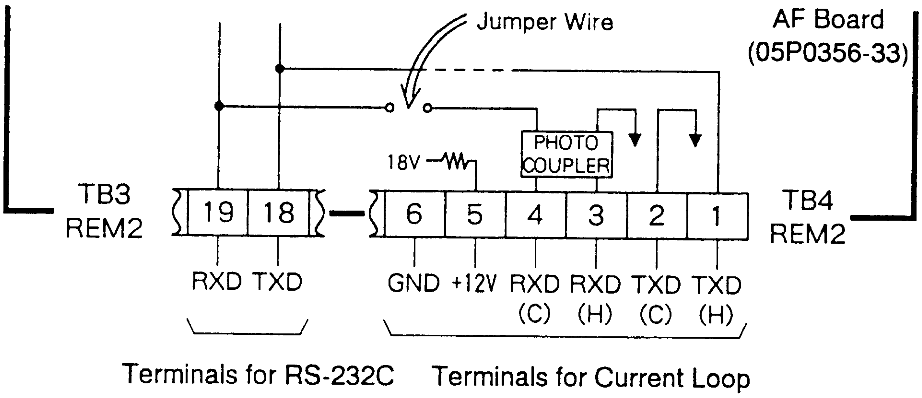
Slave Delay	:	30ms
BK Timing Pre tone	:	30ms
Post tone	:	0ms
Mute Timing Pre BK	:	0ms
Post BK	:	0ms

② When TT-1600 is connected

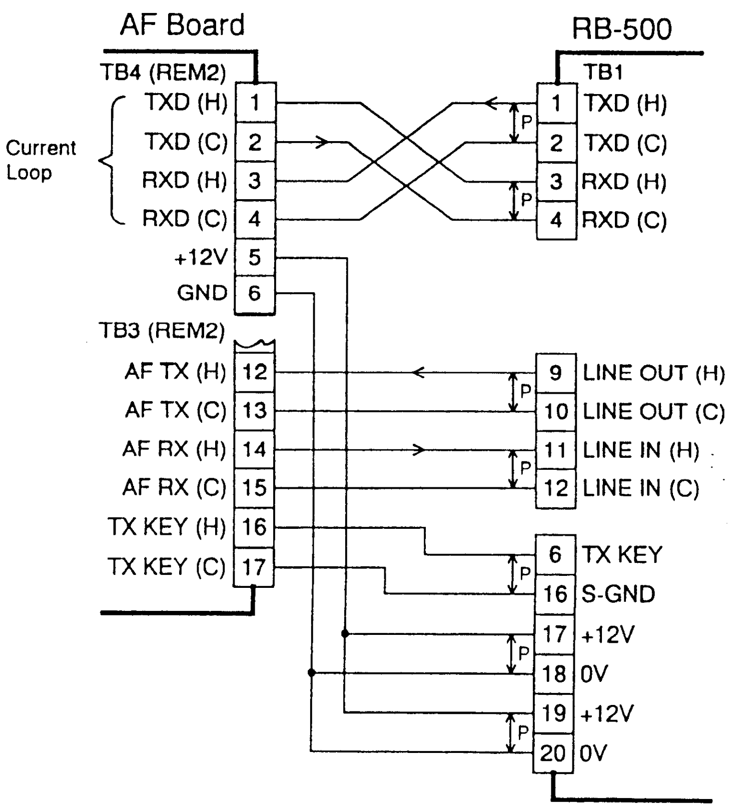
Receiver Post Mute	:	0×1.25ms
Transmitter Pre Key	:	24×1.25ms
Transmitter Post Key	:	0×1.25ms
Slave Delay	:	24×1.25ms

RB-500 CONNECTION

Connect the RB-500 to the AF board (Ver. -33 and after) in the control unit, referring to the interconnection diagram shown below.
Squelch function is available at the RB-500 for the AF board having suffix number -33. (Data format between the RB-500 and the AF board is "MIF current loop".)



Jumper Wire	Format
Short	Current Loop
Open (factory setting)	RS-232C



6. EQUIPMENT LIST

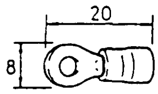
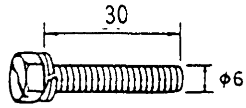
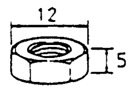
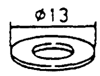
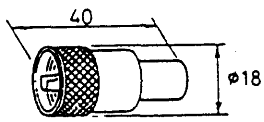
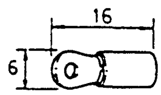
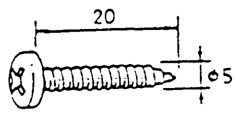
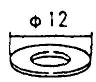
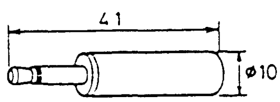
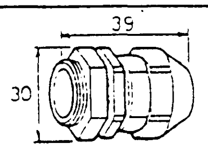
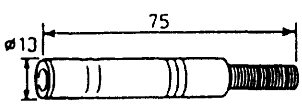
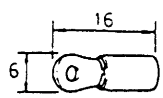
COMPLETE SET

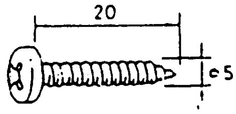
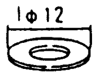
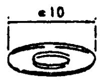
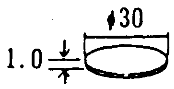
No.	Name	Type	Code No.	Wt. (kg)	Qty	Remarks
1	Control Unit	FS-5000C-50K FS-5000C-50U FS-5000C-50S	000-056-730 000-056-731 000-056-732	2.5	1	To Japan To USA Except Japan & USA
2	Transceiver Unit	FS-5000T-2 FS-5000T-3	000-056-738 000-056-775	20	1	For 24 VDC For 32 VDC
3	Antenna Coupler	AT-5000-H	000-056-874	5.4	1	
		AT-5000-HS (Option)	000-056-875	7		Stainless steel
4	Installation Materials				1 set	p. 6-2, p. 6-3
5	Accessories	FP05-03010	000-056-734		1 set	p. 6-4

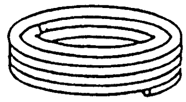
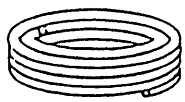
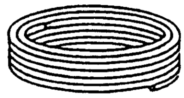
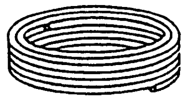
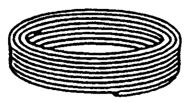
OPTIONAL SUPPLY

No.	Name	Type	Code No.	Remarks
1	Rectifier Unit	PR-850	000-120-040	see outline drawing
2	#2 Control Unit	FS-5000C-OP		w/connection cable
3	Duplex Receiving Antenna	FAW-6R2A	000-107-921	see outline drawing
4	Receiving Antenna Junction Box	AJB1-1A	000-870-284	select one, for use with duplex receiving antenna
		ARD-1	005-921-850	
5	External Speaker	SEM-21Q	000-144-917	see outline drawing
6	Installation Materials for Transmitting Antenna			p. 6-5, p. 6-6
7	Optional Installation Materials			p. 6-7, p. 6-9
8	Optional Accessories			p. 6-8
9	Dummy Load	OP05-34	005-925-830	installed at the factory if ordered before delivery
10	Antenna BK Relay	OP05-35	005-925-840	
11	Mounting Plate of Control Unit	OP05-37	005-931-760	AP2-1
12	Connector Block Assy.	OP05-49	005-841-200	Mount it to rear panel of transceiver unit.
13	R. ANT SEL Board Assy.	OP05-53	005-861-350	
14	BK Interface	BK-300		

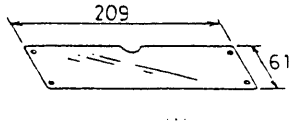
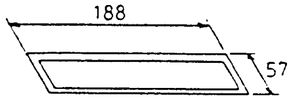
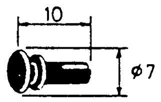
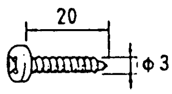
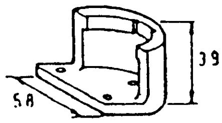
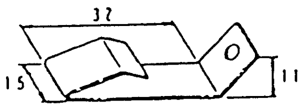
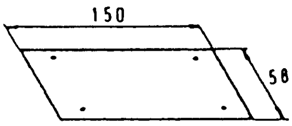
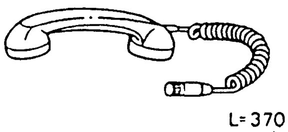
INSTALLATION MATERIALS

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	圧着端子 CRIMP-ON LUG		FV1.25-4 CODE No.	000-538-114	1	FOR ANT. COUPLER
2	六角セムスＡスリ割 HEX. BOLT (SLOTTED, WASHER HEAD)		M6×30 SUS304 CODE No.	000-800-054	4	FOR ANT. COUPLER
3	六角ナット　1　種 HEX. NUT		M6 SUS304 CODE No.	000-863-109	4	FOR ANT. COUPLER
4	ミガキ平座金 FLAT WASHER		M6 SUS304 CODE No.	000-864-129	8	FOR ANT. COUPLER
5	コネクタ CONNECTOR		M-P-7 CODE No.	000-500-512	3	FOR XCVR UNIT
6	圧着端子 CRIMP-ON LUG		FV1.25-3 RED CODE No.	000-538-113	2	FOR XCVR UNIT
7	⊕ナベタッピンＵＩネジ TAPPING SCREW		5 ×20 SUS304 CODE No.	000-800-488	6	FOR XCVR UNIT
8	ミガキ平座金 FLAT WASHER		M5 SUS304 CODE No.	000-864-128	6	FOR XCVR UNIT
9	プラグ US PLUG		PJ-2240-P CODE No.	000-110-961	3	FOR KEY, EXT SP, HEADPHONE
10	スーパーシール CABLE GLAND		NW-12M CODE No.	000-116-434	2	FOR CONTROL UNIT
11	インラインジャック INLINE JACK		T-07051 CODE No.	000-121-824	2	FOR HEADPHONE
12	圧着端子 CRIMP-ON LUG		FV1.25-3 赤 RED CODE No.	000-538-113	2	FOR CONTROL UNIT

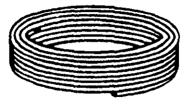
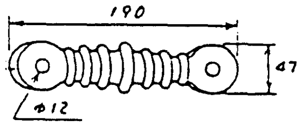
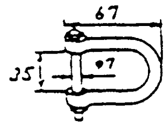
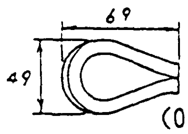
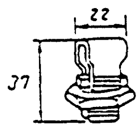
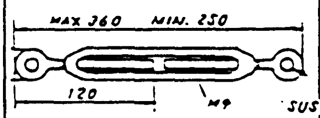
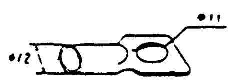
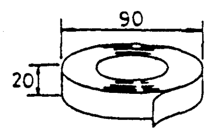
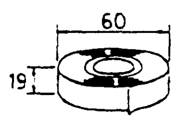
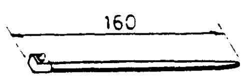
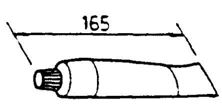
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			CODE No.	000-800-488		
14	ミガキ平座金 FLAT WASHER		M5 SUS304		4	コントローラ用 FOR CONTROL UNIT
			CODE No.	000-864-128		
15	ナイロンワッシャ NYLON WASHER		5M φ10×T0.8		4	コントローラ用 FOR CONTROL UNIT
			CODE No.	000-864-971		
16	メクラ蓋 BLIND CAP		05-039-6325-0		1	アンテナカプラ用 FOR ANT. COUPLER
			CODE No.	100-164-380		

1	複合5対ケーブル 5P TWISTED PAIR CABLE	 L=10m	05S0309-0 *10m*		☐	選択品 標準10m 2本 それ以上の時は， 必要長を指定のこと (10m 単位) STANDARD 10m, 2 ROLLS. SPECIFY LENGTH IF LONGER CABLE IS REQUIRED. (10m STEPS)
			CODE No.	000-106-043		
2	複合5対ケーブル 5P TWISTED PAIR CABLE	 L=20m	05S0309-0 *20m*		☐	
			CODE No.	000-106-044		
3	複合5対ケーブル 5P TWISTED PAIR CABLE	 L=30m	05S0309-0 *30m*		☐	
			CODE No.	000-106-046		
4	複合5対ケーブル 5P TWISTED PAIR CABLE	 L=40m	05S0309-0 *40m*		☐	
			CODE No.	000-106-047		
5	複合5対ケーブル 5P TWISTED PAIR CABLE	 L=50m	05S0309-0 *50m*		☐	
			CODE No.	000-106-048		

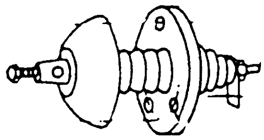
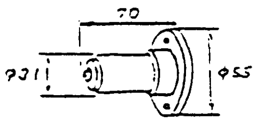
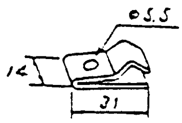
ACCESSORIES

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	カードホルダー CARD HOLDER		05-039-6212-0 CODE No. 100-121-490	1	
2	周波数カード FREQUENCY TABLE		05-039-6213-0 CODE No. 100-121-500	2	
3	ナイロンプッシュリベット NYLON PUSH RIVET		FNRP 3x6.5 黒 BLK CODE No. 000-865-859	4	
4	バインドタッピンネジ TAPPING SCREW		3x20 SUS304 ポリシール クロ 1種 CODE No. 000-801-662	6	
5	ハンガー HANDSET HANGER		05-024-1001-1 CODE No. 100-095-691	2	
6	押えバネ STOPPER		05-024-1002-1 CODE No. 100-095-701	1	
7	テンプレート TEMPLATE		05-024-1003-1 CODE No. 100-095-711	1	
8	ハンドセット HANDSET		HS-6000FZ5 CODE No. 000-112-623	1	

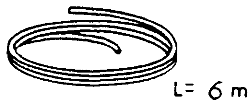
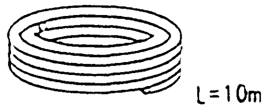
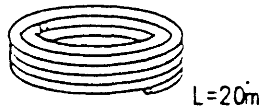
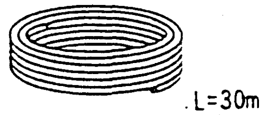
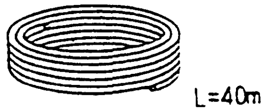
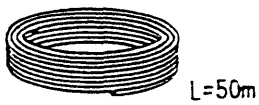
WIRE ANTENNA MATERIALS (option)

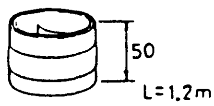
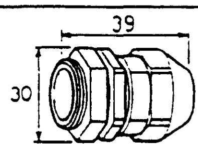
番号 No.	名　称 NAME	略　図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	アンテナ線 ANTENNA WIRE		14sq. ビニール被膜銅線		60m	
			CODE No.			
2	波形碍子 STRAIN INSULATOR		YT-180		10	
			CODE No.	000-570-021		
3	シャックル SHACKLE		M4S SUS		20	
			CODE No.	000-572-252		
4	シンブル THIMBLE	 (0.05kg)	No.14S SUS		16	
			CODE No.	000-572-254		
5	ボルトコネクタ WIRE CLIP	 (0.07kg)	PBC-4		30	
			CODE No.	000-572-255		
6	ターンバックル TURN-BACKLE		TB-E/E Max. 360/250		2	
			CODE No.			
7	銅管ラグ COPPER TUBE LUG		φ10用 4-110753		2	
			CODE No.	000-572-260		
8	エフコテープ VALCANIZING TAPE U		0.5×20×10000 000-835-034		3	
			CODE No.	000-571-510		
9	ビニールテープ VINYL TAPE		0.2×19×10000, 7D		3	
			CODE No.	000-835-029		
10	コンベックス CABLE TIE				20	
			CODE No.			
11	シリコンゴム SILICONE SEALANT				1	
			CODE No.			

ANTENNA LEAD-IN KIT (option)

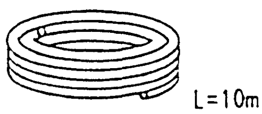
番号 No.	名　称 NAME	略　図 OUTLINE	型名／規格 DESCRIPTIONS		数量 Q'TY	用途／備考 REMARKS
1	傘型碍子 LEAD-IN INSULATOR		YA-256		1	
			CODE No.	000-571-433		
2	台碍子 STAND-OFF INSULATOR		PG-70 フレミグラス		7	
			CODE No.	000-109-751		
3	銅パイプ COPPER TUBE		φ6 ×5m		1	
			CODE No.	000-595-204		
4	銅管ラグ COPPER TUBE LUG		φ6 用　4-110753		6	
			CODE No.	000-572-258		
5	ケーブルホルダ CABLE HOLDER		4-173175		7	
			CODE No.			

OPTIONAL INSTALLATION MATERIALS (p.6-7andp.6-9)

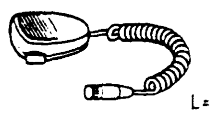
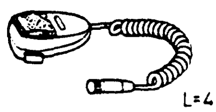
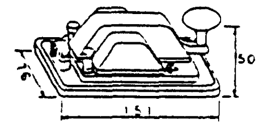
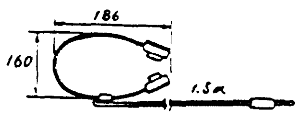
番号 No.	名　称 NAME	略　図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	電源ケーブル POWER CABLE		VCT-8.0 ×2C CODE No. 000-106-049	*	
2	同軸ケーブル COAXIAL CABLE		RG-8A/U, 10m CODE No. 000-106-052	*	
3	同軸ケーブル COAXIAL CABLE		RG-8A/U, 20m CODE No. 000-106-053	*	
4	同軸ケーブル COAXIAL CABLE		RG-8A/U, 30m CODE No. 000-106-054	*	
5	同軸ケーブル COAXIAL CABLE		RG-8A/U, 40m CODE No. 000-106-055	*	
6	同軸ケーブル COAXIAL CABLE		RG-8A/U, 50m CODE No. 000-106-056	*	

1	アース銅板 COPPER STRAP		0.4 ×50×1200 CODE No. 000-810-249	*	
2	スーパーシール GROMMET		NW-12M CODE No. 000-116-434	*	

INSTALLATION MATERIALS FOR #2 CONTROL UNIT (option)

1	複合5対ケーブル 5P TWISTED PAIR CABLE		05S0309-0 *10m* CODE No. 000-106-043	*	Max. 50m (Refer to page 6-3.)

OPTIONAL ACCESSORIES

番号 No.	名　称 NAME	略　図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	カールコードマイク CURL CORD MIC.	 L=410	DM1620FZ1 CODE No. 000-112-622	*	
2	ノイズキャンセラマイク NOISE CANCELLER MIC.	 L=410	M112D45099 CODE No. 000-116-487	*	
3	電　鍵 TELEGRAPH KEY		HK-707 CODE No. 000-589-102	*	
4	ヘ ッ ド ホ ン HEADPHONE		ST-90 CODE No. 000-580-302	*	

OPTIONAL INSTALLATION MATERIALS

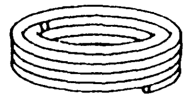
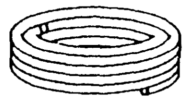
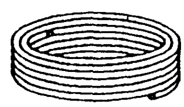
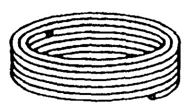
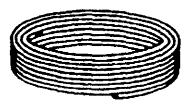
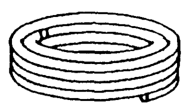
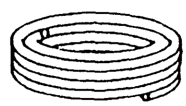
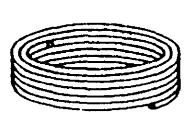
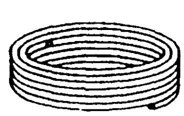
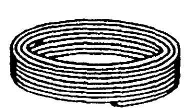
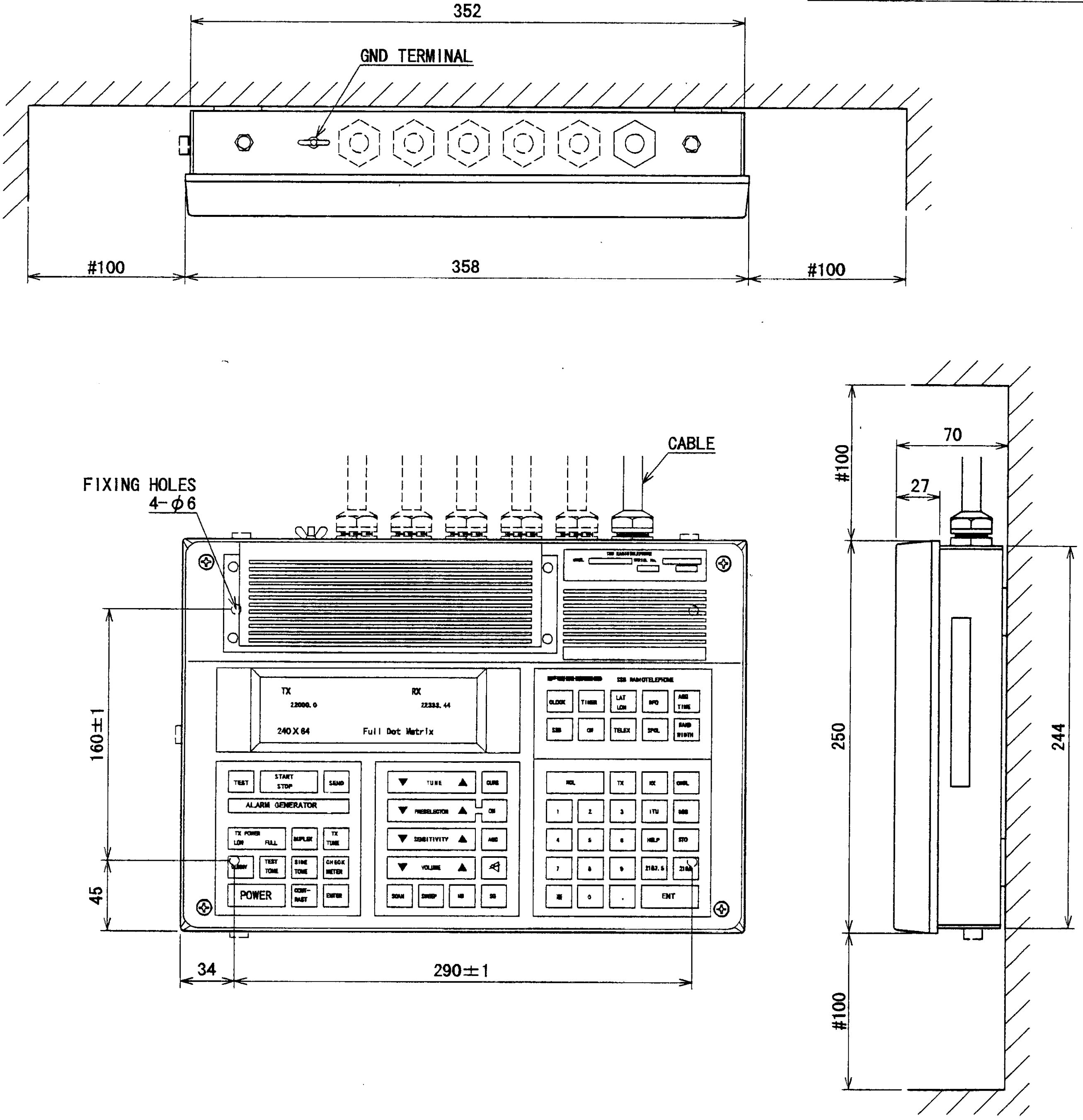
番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	複合5対ｹｰﾌﾞﾙ 5P TWISTED PAIR CABLE WITH ARMOR	 L=10m	05S0793-0 *10M* CODE NO. 000-125-984	1	鎧装付 WITH ARMOR
1	複合5対ｹｰﾌﾞﾙ 5P TWISTED PAIR CABLE WITH ARMOR	 L=20m	05S0793-0 *20M* CODE NO. 000-125-986	1	鎧装付 WITH ARMOR
1	複合5対ｹｰﾌﾞﾙ 5P TWISTED PAIR CABLE WITH ARMOR	 L=30m	05S0793-0 *30M* CODE NO. 000-125-987	1	鎧装付 WITH ARMOR
1	複合5対ｹｰﾌﾞﾙ 5P TWISTED PAIR CABLE WITH ARMOR	 L=40m	05S0793-0 *40M* CODE NO. 000-125-988	1	鎧装付 WITH ARMOR
1	複合5対ｹｰﾌﾞﾙ 5P TWISTED PAIR CABLE WITH ARMOR	 L=50m	05S0793-0 *50M* CODE NO. 000-125-989	1	鎧装付 WITH ARMOR
1	同軸ｹｰﾌﾞﾙ COAX.CABLE WITH ARMOR	 L=10m	RG-10/U-Y *10M* CODE NO. 000-125-999	1	鎧装付 WITH ARMOR
1	同軸ｹｰﾌﾞﾙ COAX.CABLE WITH ARMOR	 L=20m	RG-10/U-Y *20M* CODE NO. 000-563-044	1	鎧装付 WITH ARMOR
1	同軸ｹｰﾌﾞﾙ COAX.CABLE WITH ARMOR	 L=30m	RG-10/U-Y *30M* CODE NO. 000-563-048	1	鎧装付 WITH ARMOR
1	同軸ｹｰﾌﾞﾙ COAX.CABLE WITH ARMOR	 L=40m	RG-10/U-Y *40M* CODE NO. 000-126-000	1	鎧装付 WITH ARMOR
1	同軸ｹｰﾌﾞﾙ COAX.CABLE WITH ARMOR	 L=50m	RG-10/U-Y *50M* CODE NO. 000-126-001	1	鎧装付 WITH ARMOR

TABLE 1

DIMENSION (mm)	TOL. (mm)
0 ＜ L ≦ 50	±1.5
50 ＜ L ≦ 100	±2.5
100 ＜ L ≦ 500	±3

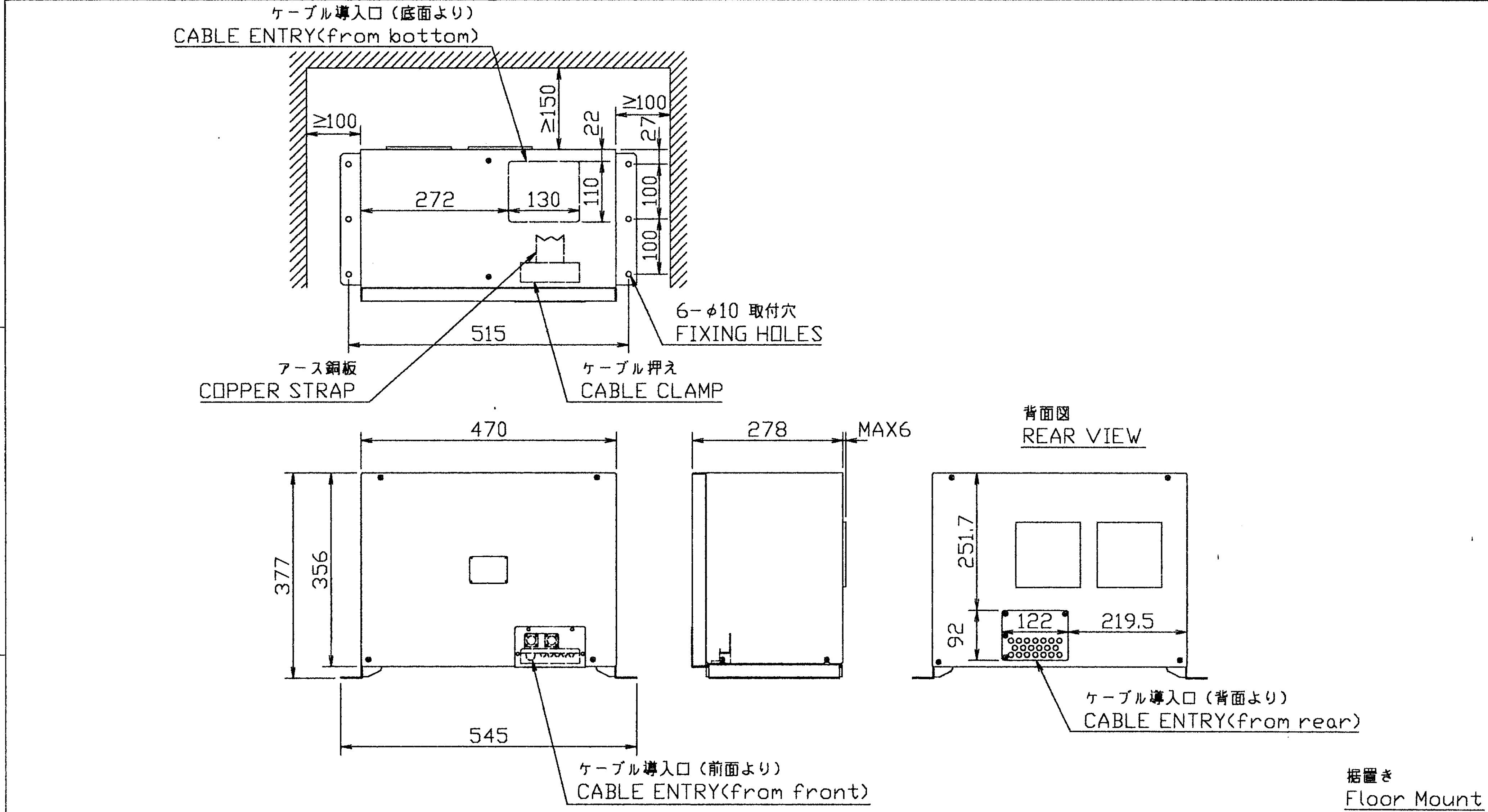


NOTE

1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN Oct 19 '00 T.YAMASAKI		TITLE FS-5000C
CHECKED Oct 19 '00 Y.K		NAME CONTROL UNIT
APPROVED Oct 19 '00 Y.K	FS-5000/8000	OUTLINE DRAWING
SCALE 1/4 ; MASS 2.5 kg ±10%		REMARKS
DWG. No. E5519-G01- B		

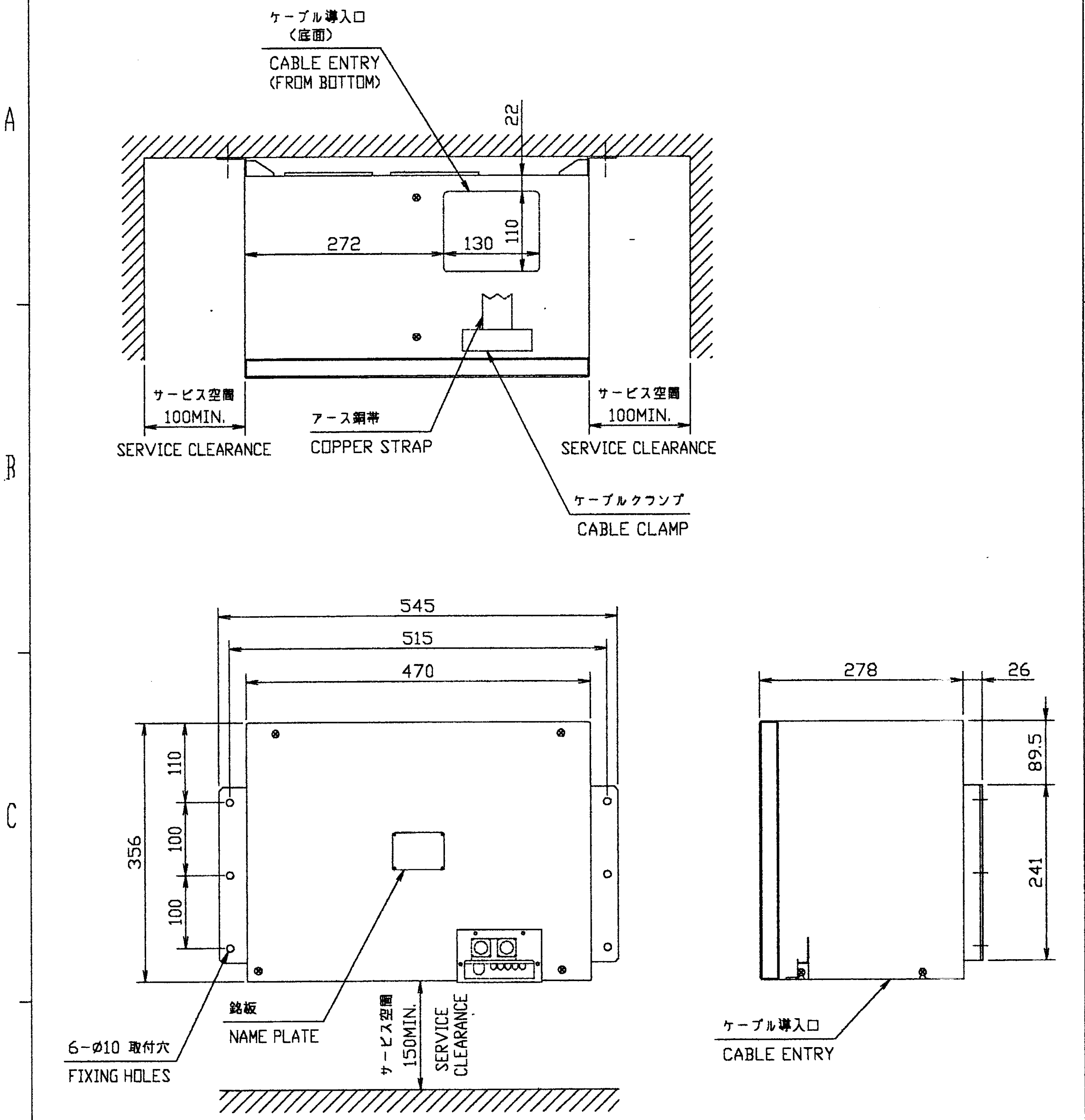
FURUNO ELECTRIC CO., LTD.



DRAWN Jun. 27 '01	T. YAMASAKI	TITLE	FS-5000T
CHECKED Jun. 27 '01	Y. KIMURA	名称	トランシーバユニット
APPROVED Jun. 27 '01	Y. KIMURA		外寸図
SCALE 1/10	MASS 20 ±10% kg	NAME	TRANSCEIVER
DWG.No.	C5519-G03-F		OUTLINE DRAWING

FS-1600/2500/5000

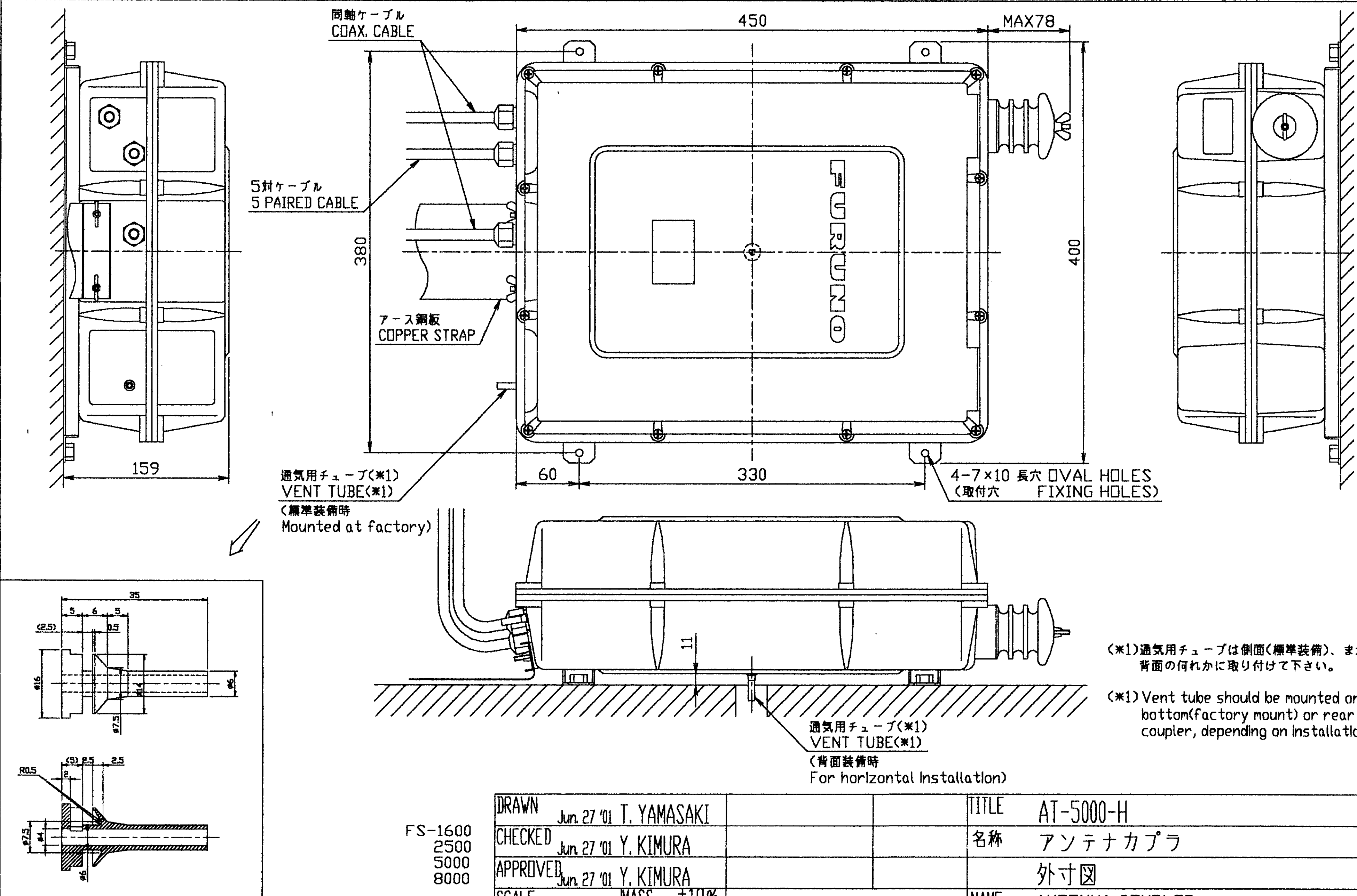
FURUNO ELECTRIC CO., LTD.



DRAWN Jun. 27 '01	T. YAMASAKI	TITLE	FS-1600/2500/5000
CHECKED Jun. 27 '01	Y. KIMURA	名称	トランシーバ壁掛装備図
APPROVED Jun. 27 '01	Y. KIMURA		外寸図
SCALE 1/8	MASS 20 ±10% kg	NAME	BULKHEAD MOUNTING OF TRANSCEIVER UNIT
DWG.No.	C5519-G07-C		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO



通気用チューブ
VENT TUBE

(※1)通気用チューブは側面(標準装備)、または背面の何れかに取り付けて下さい。

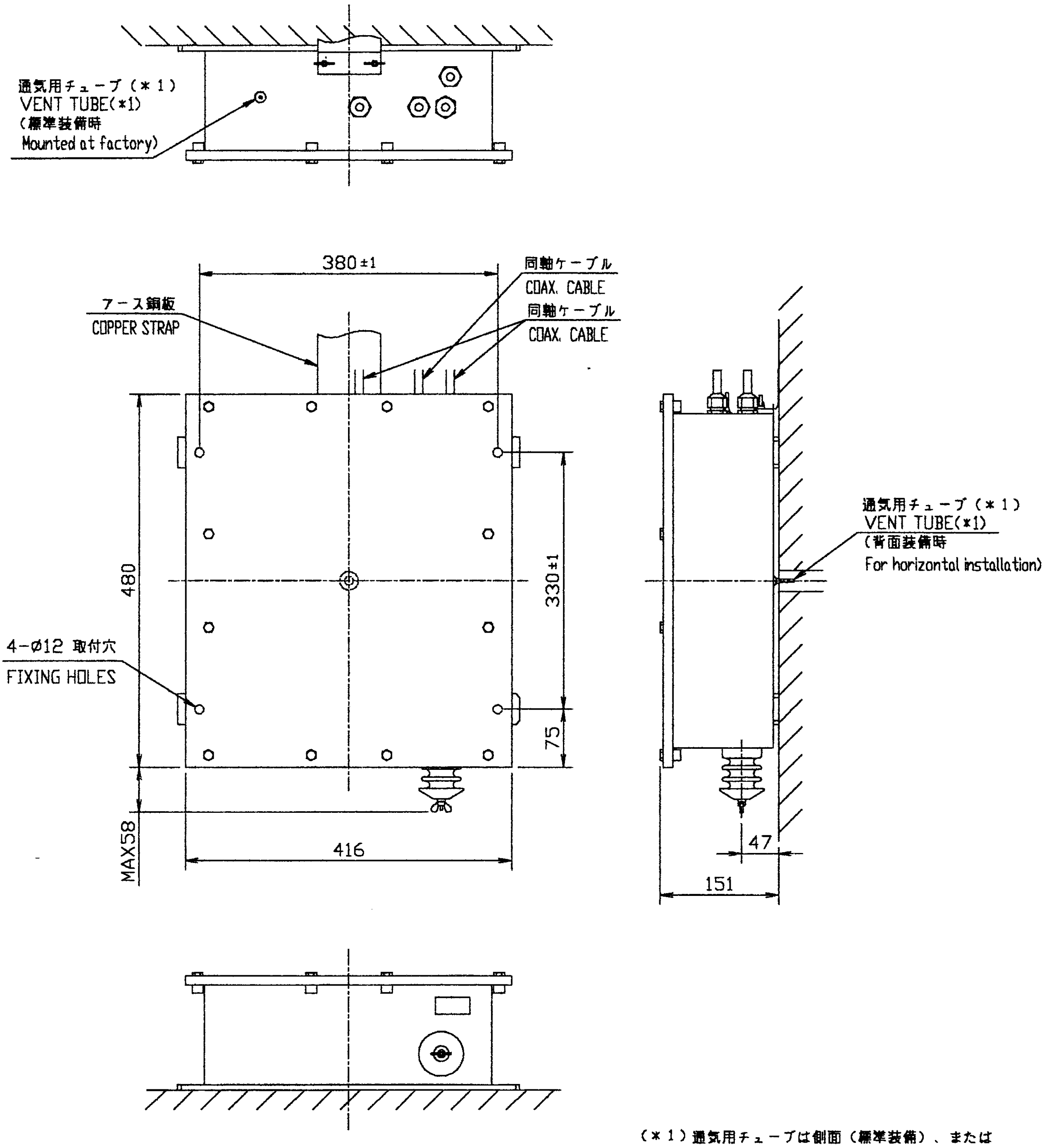
(※1) Vent tube should be mounted on either bottom(factory mount) or rear of the coupler, depending on installation methods.

FS-1600
2500
5000
8000

DRAWN	Jun. 27 '01 T. YAMASAKI	TITLE	AT-5000-H
CHECKED	Jun. 27 '01 Y. KIMURA	名称	アンテナカプラ
APPROVED	Jun. 27 '01 Y. KIMURA		外寸図
SCALE 1/5	MASS 5.4 ±10% kg	NAME	ANTENNA COUPLER
DWG.No.	C5519-G02-D		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO

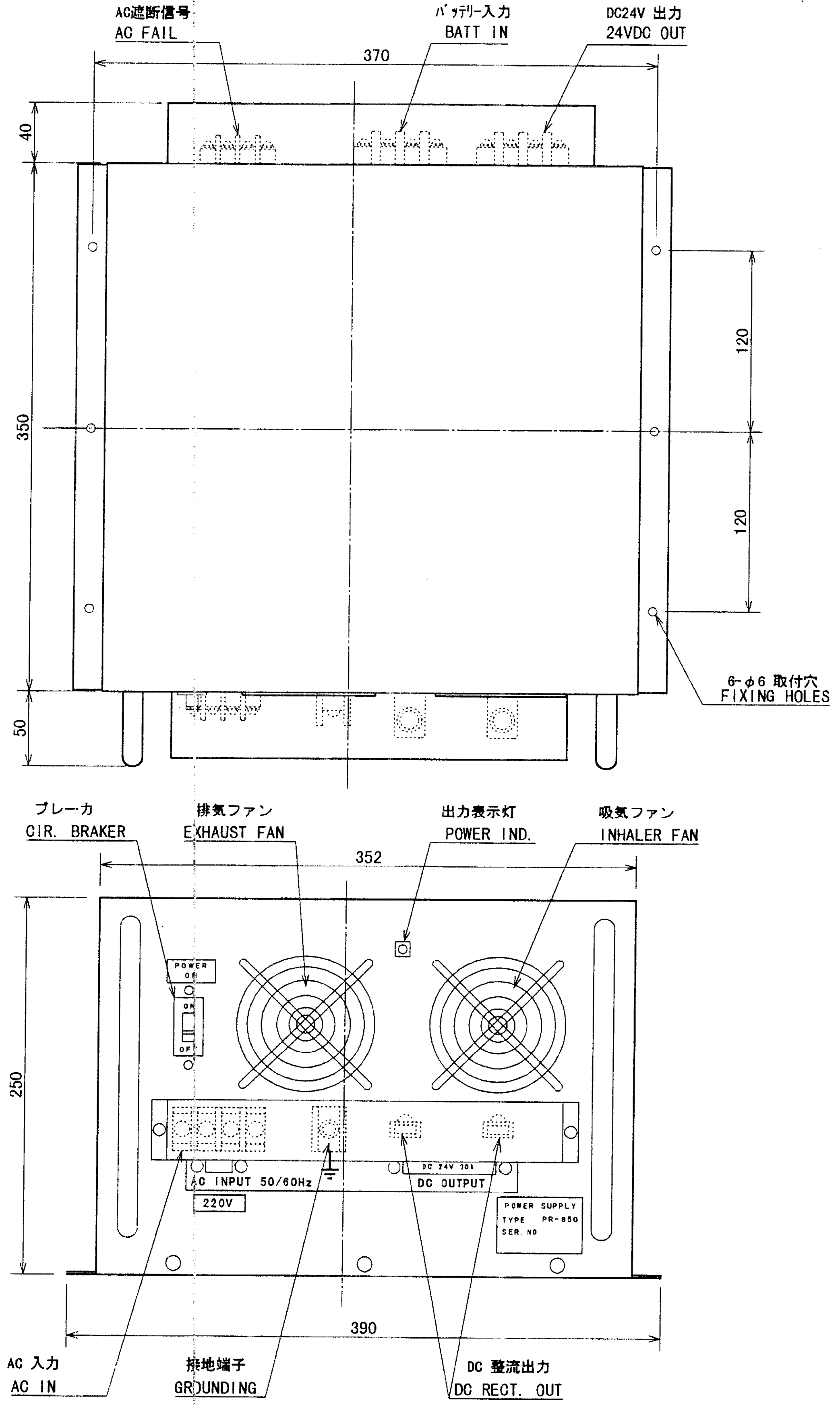


（＊1）通気用チューブは側面（標準装備）、または背面の何れかに取り付けて下さい。

（＊1）Vent tube should be mounted on either bottom (factory mount) or rear of the coupler, depending on installation methods.

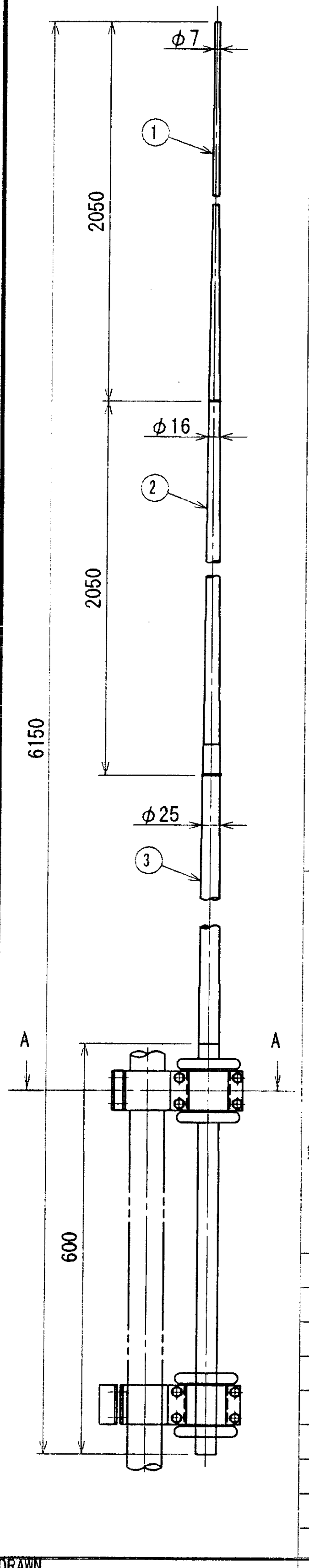
DRAWN Jun. 27 '01	T. YAMASAKI	TITLE	AT-5000-HS(OPTION)
CHECKED Jun. 27 '01	Y. KIMURA	名称	アンテナカプラ（ヘビーデューティ用）
APPROVED Jun. 27 '01	Y. KIMURA		外寸図
SCALE 1/8	MASS 7 ±10% kg	NAME	ANTENNA COUPLER (FOR HEAVY DUTY)
DWG.No.	C-5519-G10-B		OUTLINE DRAWING

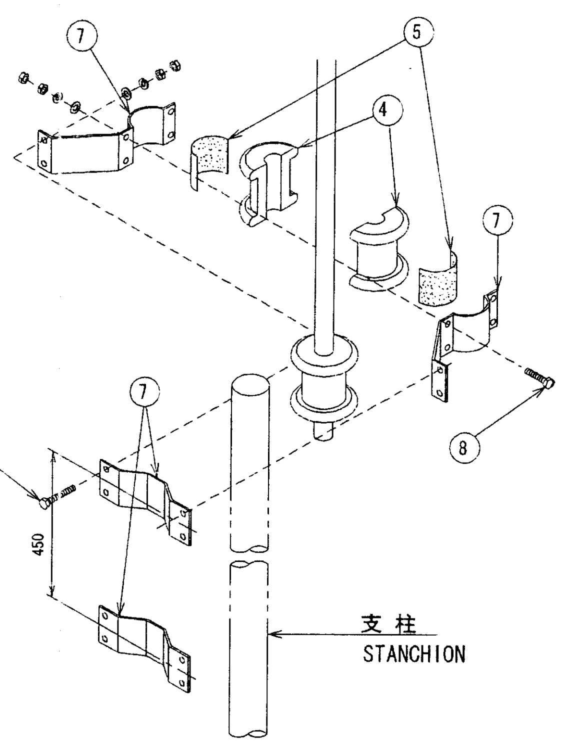
FURUNO ELECTRIC CO., LTD.



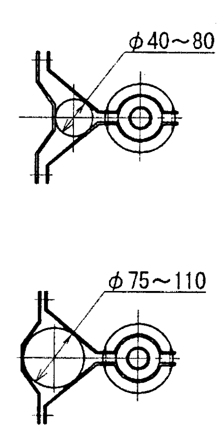
DRAWN June 27 '00 T. YAMASAKI		TITLE	PR-850A
CHECKED June 27 '00 T. Kim		名称	AC-DC電源ユニット
APPROVED June 27 '00 T. Kim			外寸図
SCALE 1/4	MASS 35 kg	NAME	AC-DC POWER SUPPLY UNIT
DWG. No. C5519-G11-E			OUTLINE DRAWING

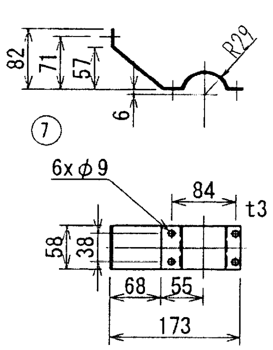
FURUNO ELECTRIC CO., LTD.

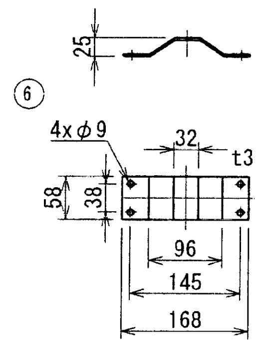




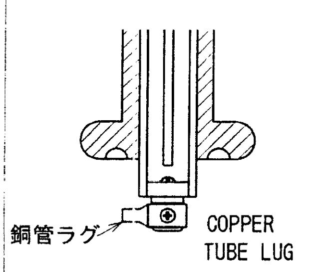
装備例 （支柱造船所手配）
EXAMPLE OF INSTALLATION



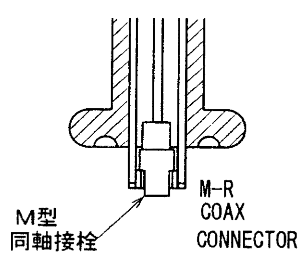




FAW-6R2A



FAW-6RP2A

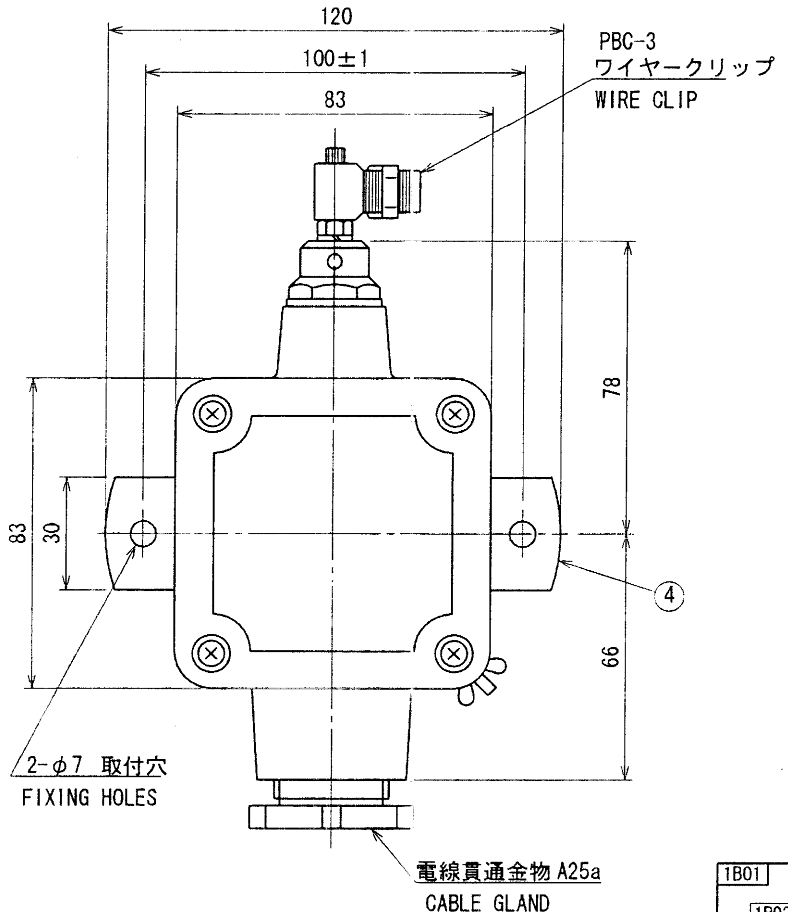


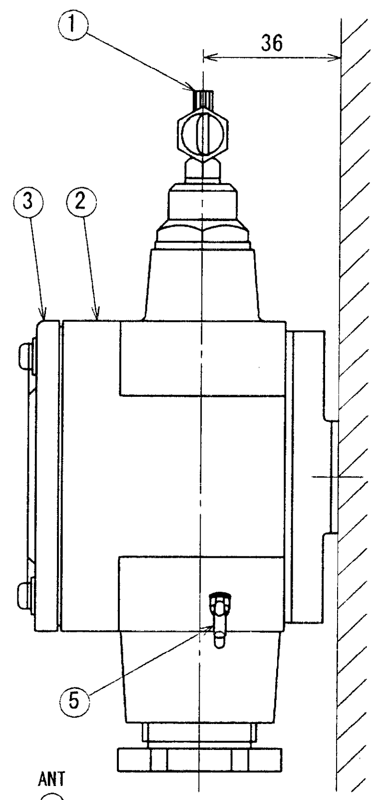
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG No.	摘要 REMARKS
8	ボルト／ナット BOLT/NUT	SUS305	8 PAIRS 8 PAIRS	AKB-6HA (000-107-691)	M8x80 M8x35
7	取付金具 SUPPORT ARM	SUS305	4		t=3mm
6	押え金具 FIXING BRACKET	SUS305	2		t=3mm
5	緩衝ゴム板 CUSHION RUBBER	ネオプレンゴム NEOPREN	1	FAW-6R2 (000-572-109) OR FAW-6RP2 (000-572-108)	
4	上部ホルダー UPPER HOLDER	FRP	1/2x2		
3	基部素子 LOWER ELEMENT	グラスファイバ FIBER GLASS	1		
2	継素子 MIDDLE ELEMENT	グラスファイバ FIBER GLASS	1		
1	上部素子 UPPER ELEMENT	グラスファイバ FIBER GLASS	1		

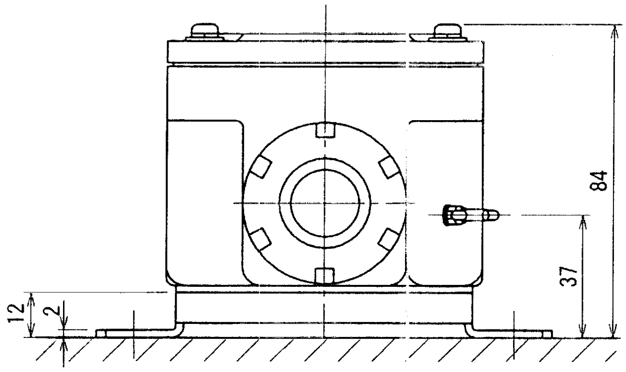
DRAWN Sep.27'00 T.YAMASAKI	TITLE FAR-6R2A/6RP2A
CHECKED Sep.27'00	名称 ホイップアンテナ 外寸図
APPROVED Sep.27'00	
SCALE 1/10 ; MASS ±10% ELEMENT: 3 BRACKET: 1 kg	NAME WHIP ANTENNA OUTLINE DRAWING
DWG. No. C5011-040- C	

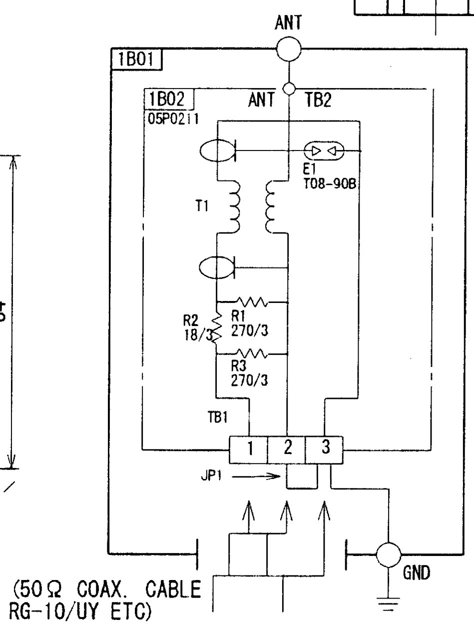
FURUNO ELECTRIC CO., LTD.

1 2 3







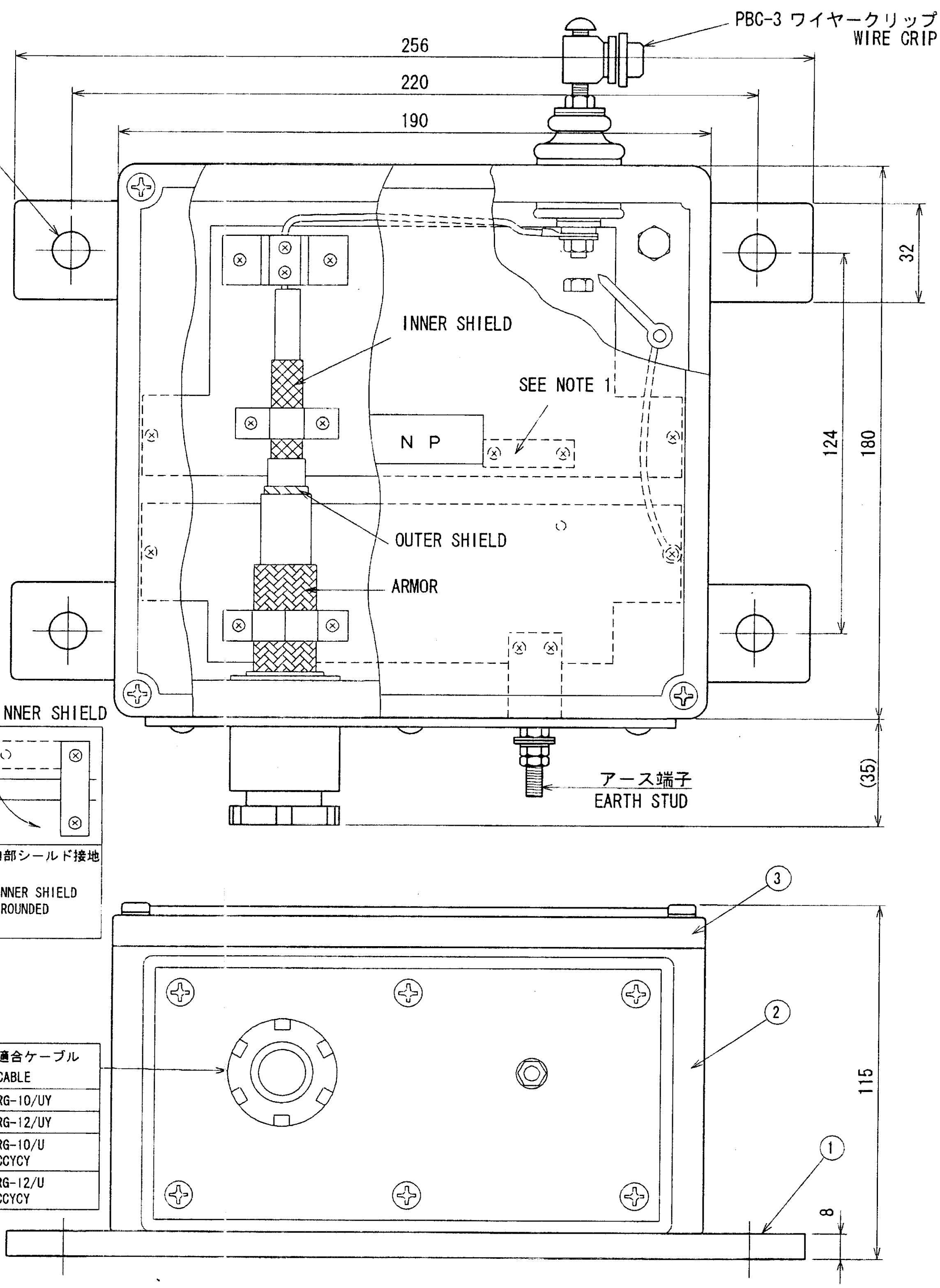


NOTE: JPI MAY BE REMOVED IF GND STUD IS GROUNDED TO SHIP'S BODY.
注記：アース端子を船体に接地したときはJP1の切断可。

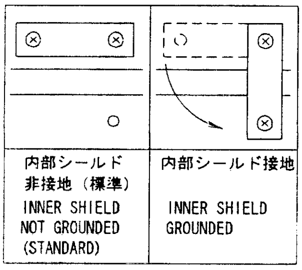
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS
5	アース端子 EARTH TERMINAL	SUS304BD	1		
4	取付足 FIXING PLATE	SUS304	1		
3	カバー COVER	SUS304	1		
2	本体 BODY	FRP (DMC)	1		
1	アンテナ端子 ANT TERMINAL	SUS303B	1		

DRAWN	Oct 16 '00 T.YAMASAKI
CHECKED	Oct 19 '00 Y.K.
APPROVED	Oct 19 '00 Y.K.
SCALE	1/2
MASS	0.7 kg ±10%
DWG. No.	C5017-064- F
TITLE	ARD-1
名称	受信空中線接続箱 外寸図
NAME	RECEIVING ANTENNA JUNCTION BOX OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



NOTE 1
接続箱内の処理
CONNECTION OF INNER SHIELD



型名 TYPE	グランド GLAND	適合ケーブル CABLE
AJB1-1[A]	A25a	RG-10/UY
		RG-12/UY
AJB1-1[C]	A25c	RG-10/U CCYCY
		RG-12/U CCYCY

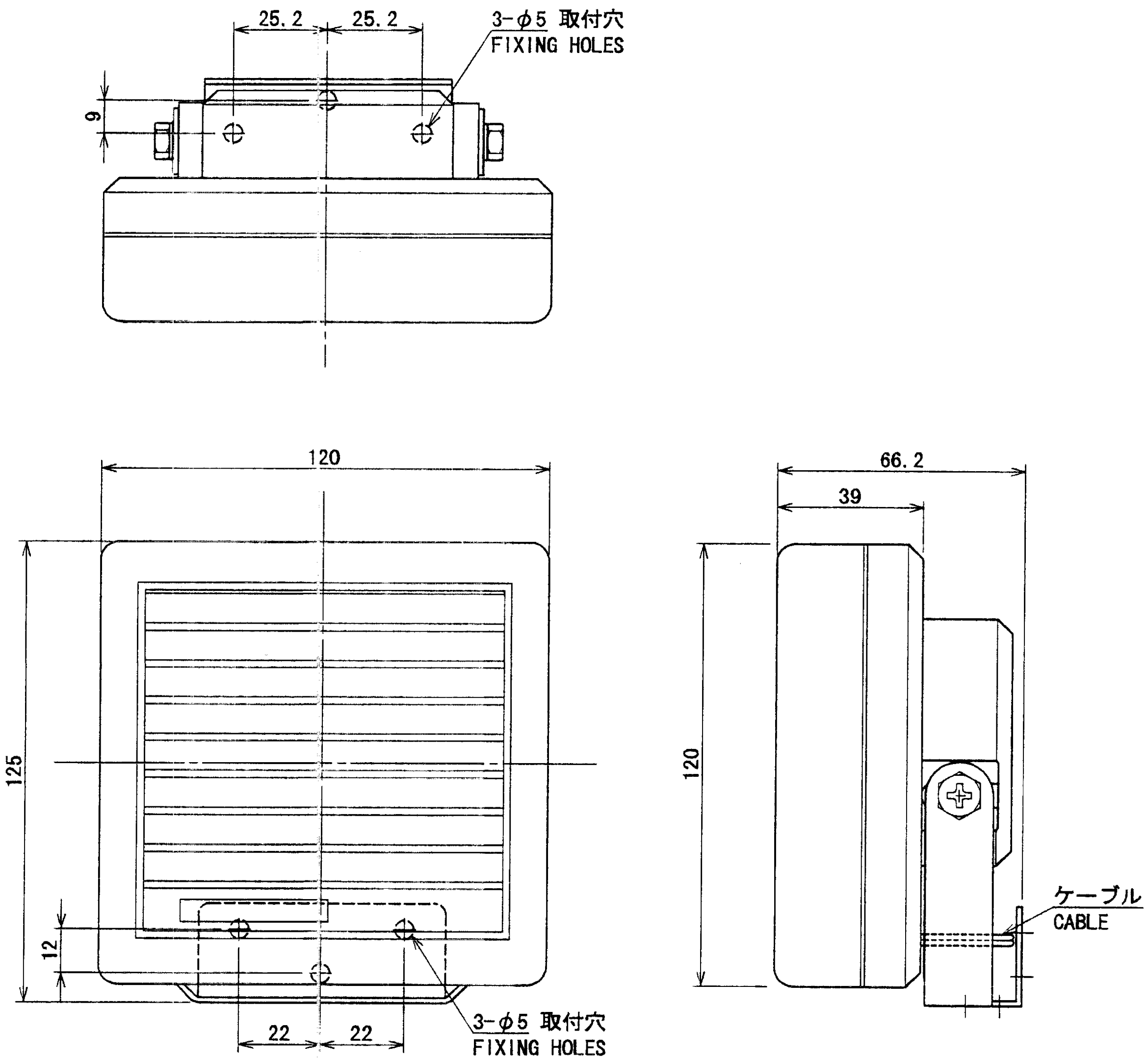
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO	摘要 REMARKS
3	蓋 LID	SUS304	1		
2	筐体 CASE	FRP	1		
1	取付金具 BRACKET	SUS304	1		t=3

DRAWN	Oct 16 '00 T.YAMASAKI
CHECKED	Oct 19 '00 T.K.
APPROVED	Oct 19 '00 T.K.
SCALE	1/2
MASS ±10%	4 kg
DWG. No.	C5017-046- G
	4-110770
TITLE	AJB1-1A/B/C
名称	受信空中線接続箱 外寸図
NAME	RECEIVING ANTENNA JUNCTION BOX OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

表1　TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 ＜ L ≦ 50	±1.5
50 ＜ L ≦ 100	±2.5
100 ＜ L ≦ 500	±3



注記

1）指定なき寸法公差は表1による。

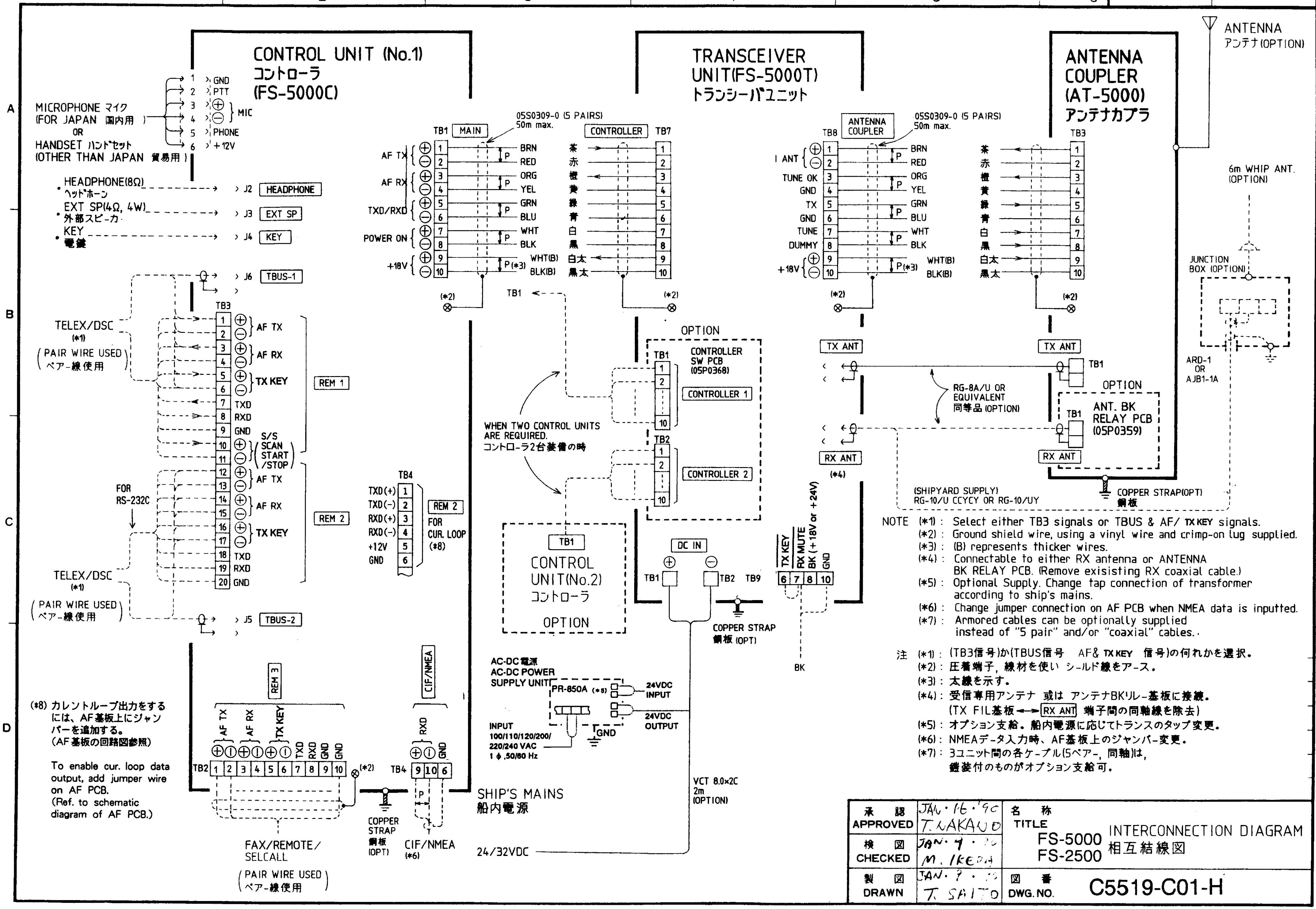
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN May 23 '01 T. YAMASAKI		TITLE	SEM-21Q
CHECKED May 24 '01 Y. Kimi		名称	スピーカ
APPROVED May 24 '01 Y. Kimi			外寸図
SCALE 1/2	MASS 0.54 kg ±10% 質量は2.8mケーブルを含む MASS W/ 2.8m CABLE	NAME	LOUDSPEAKER
DWG. No. C5016-G07- A			OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

LIST OF SCHEMATIC DIAGRAMS



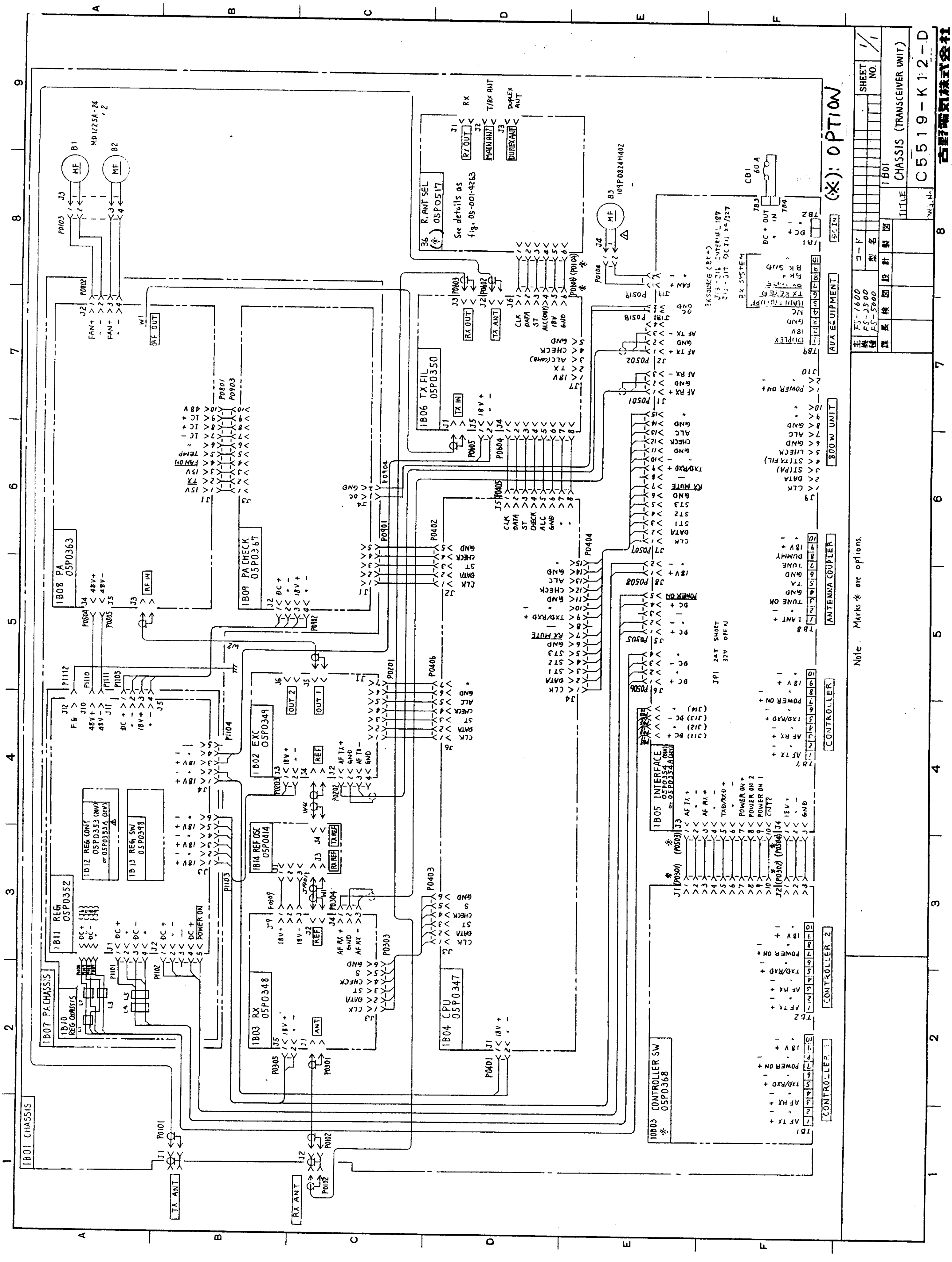
NOTE
- (*1) : Select either TB3 signals or TBUS & AF/ TX KEY signals.
- (*2) : Ground shield wire, using a vinyl wire and crimp-on lug supplied.
- (*3) : (B) represents thicker wires.
- (*4) : Connectable to either RX antenna or ANTENNA BK RELAY PCB. (Remove exisisting RX coaxial cable.)
- (*5) : Optional Supply. Change tap connection of transformer according to ship's mains.
- (*6) : Change jumper connection on AF PCB when NMEA data is inputted.
- (*7) : Armored cables can be optionally supplied instead of "5 pair" and/or "coaxial" cables.

注
- (*1) : (TB3信号)か(TBUS信号 AF& TX KEY 信号)の何れかを選択。
- (*2) : 圧着端子，線材を使い シールド線をアース。
- (*3) : 太線を示す。
- (*4) : 受信専用アンテナ 或は アンテナBKリレー基板に接続。(TX FIL基板 ←→ RX ANT 端子間の同軸線を除去)
- (*5) : オプション支給。船内電源に応じてトランスのタップ変更。
- (*6) : NMEAデータ入力時、AF基板上のジャンパー変更。
- (*7) : 3ユニット間の各ケーブル(5ペアー、同軸)は，鎧装付のものがオプション支給可。

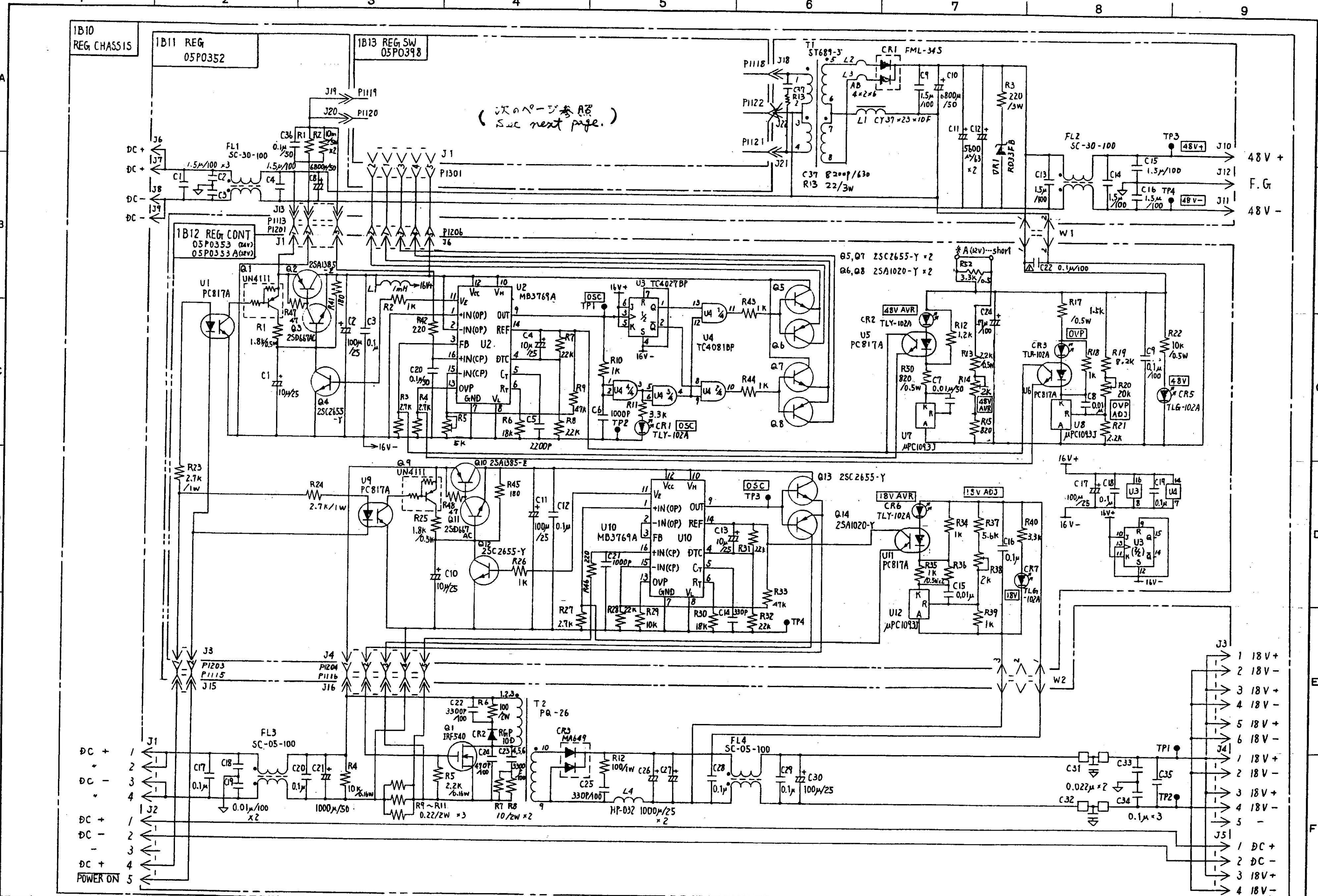
承認 APPROVED	JAN. 16. '90 T. NAKANO	名称 TITLE	FS-5000 FS-2500 INTERCONNECTION DIAGRAM 相互結線図
検図 CHECKED	JAN. 9. '90 M. IKEDA		
製図 DRAWN	JAN. 9. '90 T. SAITO	図番 DWG. NO.	C5519-C01-H

REV : MAY '90 JAN '91 Nov.'92 Aug.'93 MAR.'95
REV : AUG '91

FURUNO ELECTRIC CO., LTD.



1B01 CHASSIS (TRANSCEIVER UNIT)
C5519-K12-D
SHEET 1/1
(※): OPTION
Note. Marks ※ are options.
1B01 CHASSIS
TX ANT
RX ANT
1B02 EXC 05P0349
1B03 RX 05P0348
1B04 CPU 05P0347
1B05 INTERFACE 05P0354
1B06 TX FIL 05P0350
1B07 PA CHASSIS
1B08 PA 05P0363
1B09 PA CHECK 05P0367
1B10 REG CHASSIS
1B11 REG 05P0352
1B12 REG CONT 05P0353
1B13 REG SW 05P0398
1B14 REF OSC 05P0414
R.ANT SEL 05P0517
10B03 CONTROLLER SW 05P0368
AUX EQUIPMENT
800W UNIT
ANTENNA COUPLER
CONTROLLER
CONTROLLER 2
FS-1600
FS-3500
FS-5000



Note. Resistors are in Ω (0.1w), Capacitors are in F, Inductors are in H, unless otherwise noted.

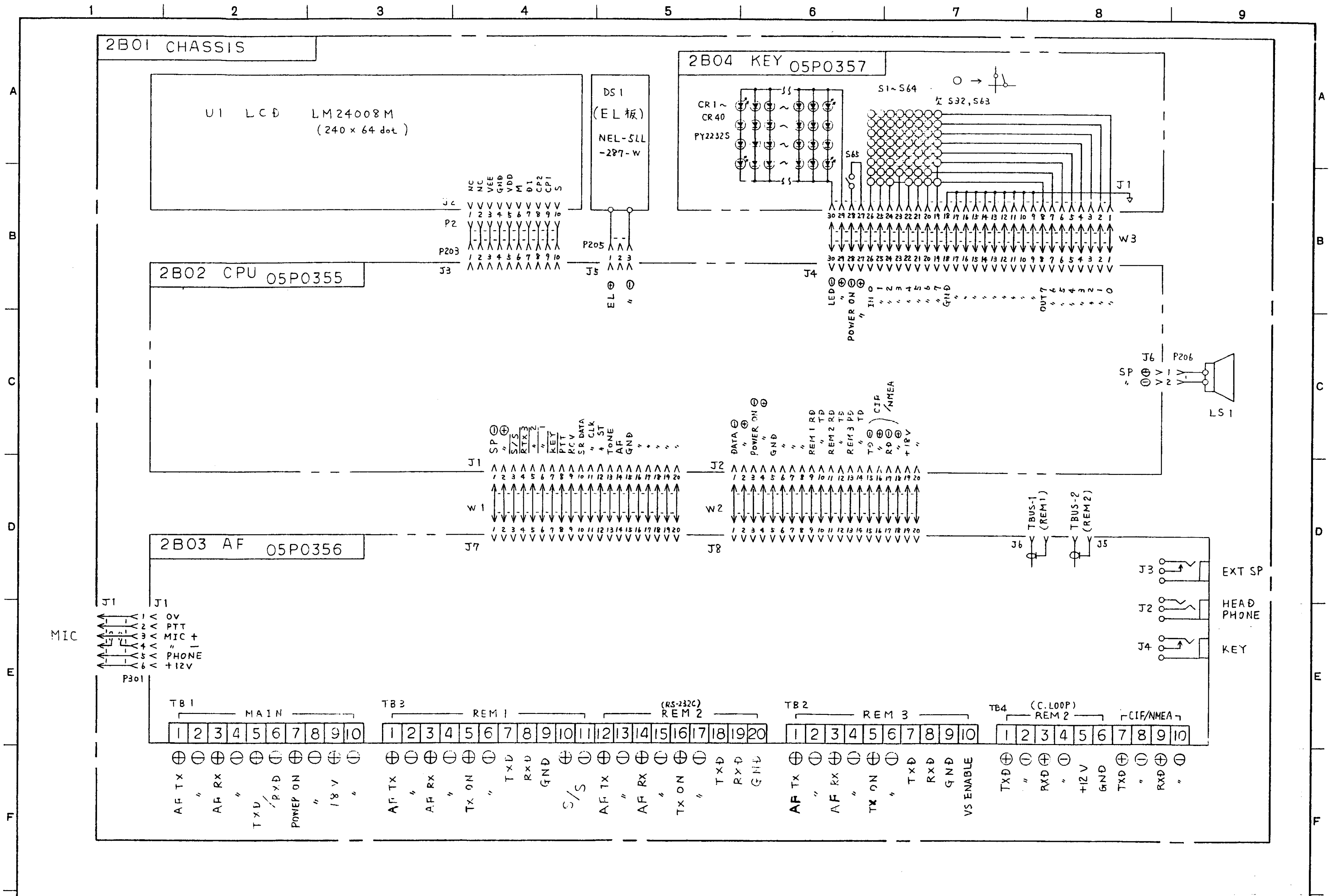
主機種	FS-1000 / FS-2500 / FS-5000	コード		SHEET NO.	1/1
		型名			

課長 検図 設計 製図

TITLE: 1B10 REG CHASSIS (TRANSCEIVER UNIT) (1B11 REG, 1B12 REG CONT, 1B13 REG SW)

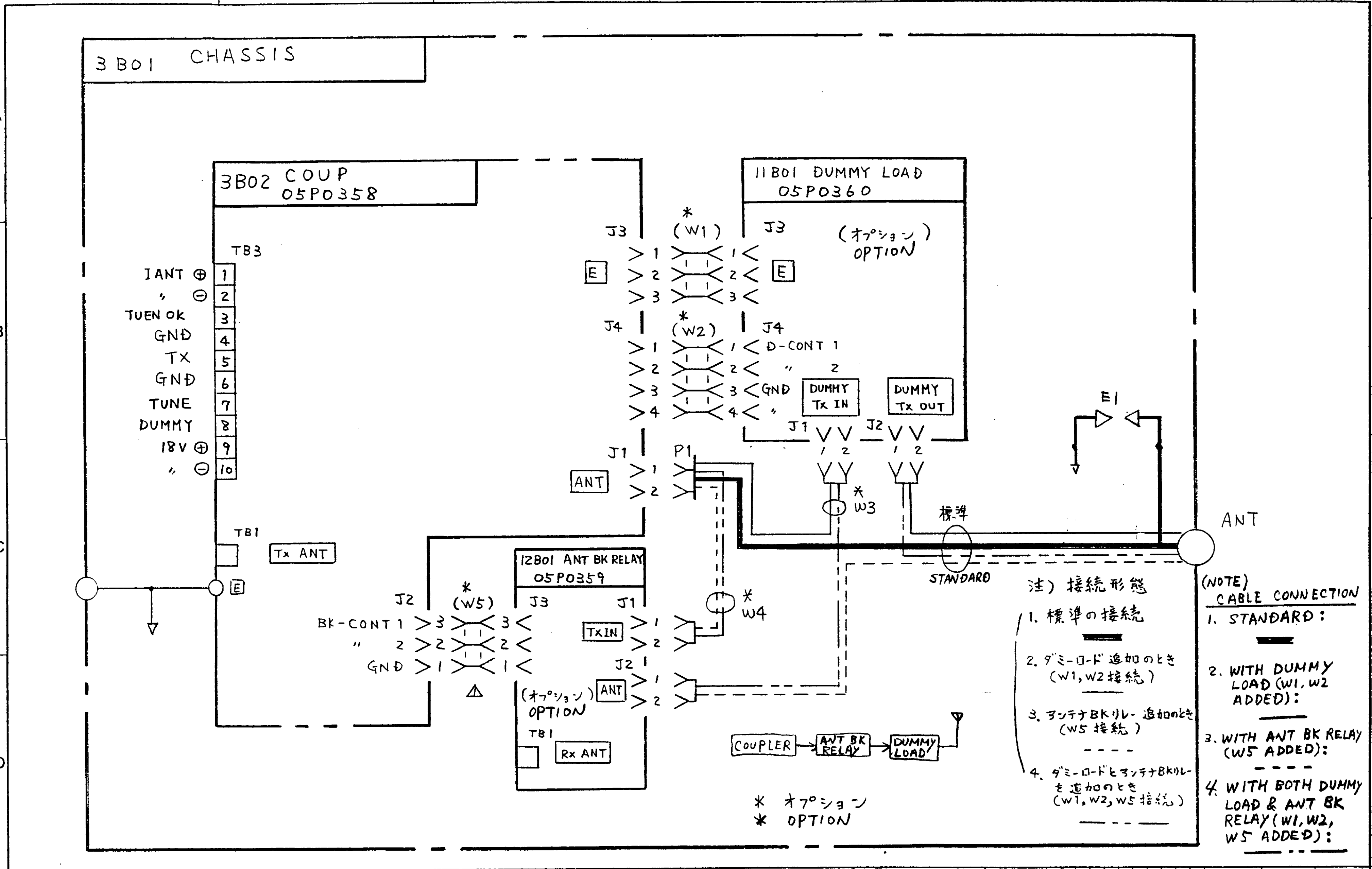
DWG. NO. C5519-K11-D

古野電気株式会社



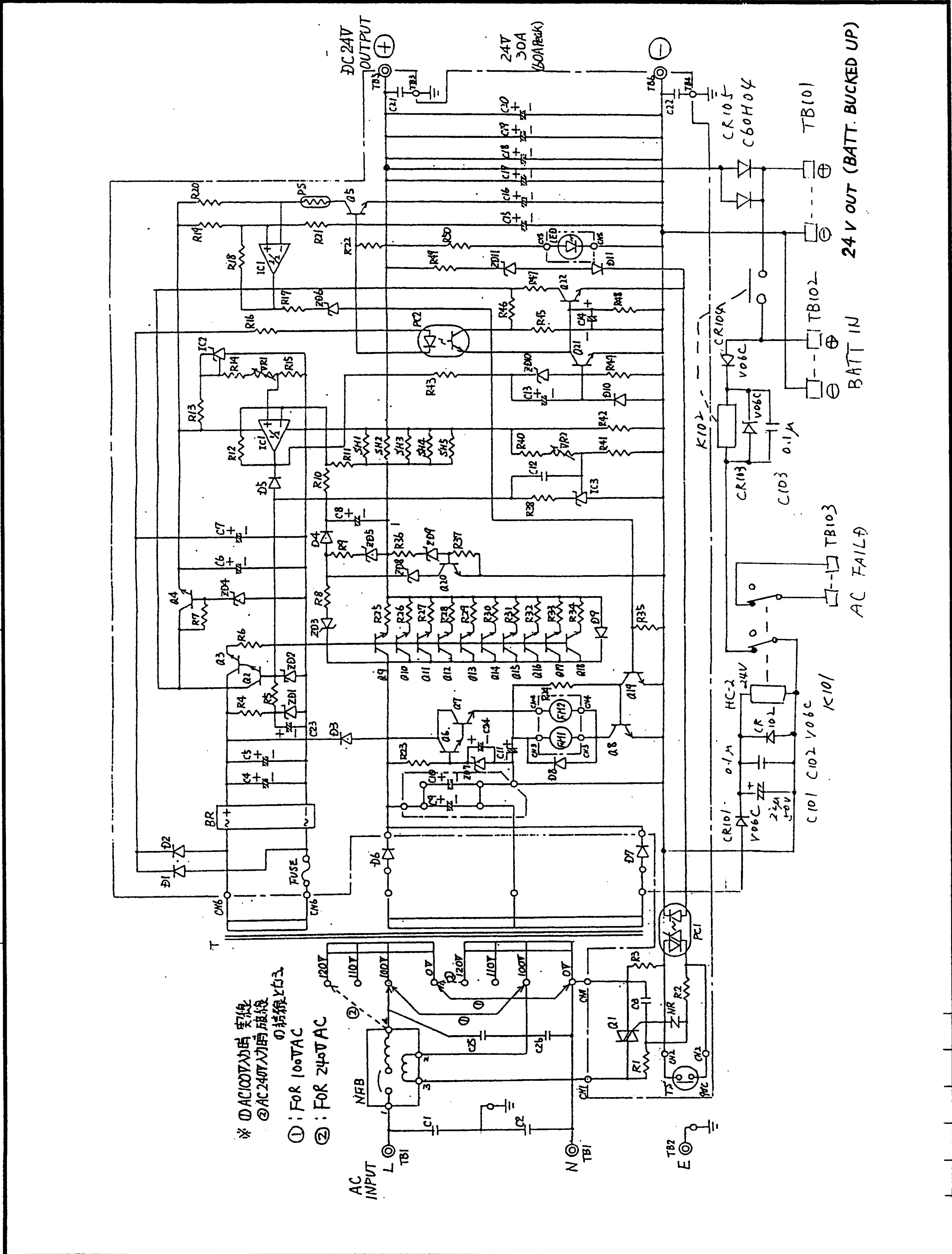
主機種	FS-1600 / FS-2500 / FS-5000	コード / 型名	SHEET NO. 1/1
課長 検図 設計 製図		TITLE	2B01 CHASSIS (CONTROLLER UNIT)
		DWG. No.	C5519-K13-C

古野電気株式会社



主機種	FS-1600 FS-2500 FS-5000/8000	コード / 型名	SHEET NO. 1/1
課 長 検 図 設 計 製 図		TITLE	3B01 CHASSIS (COUPLER UNIT)
		DWG.No.	C5519-K18-C

古野電気株式会社



REMARKS		TYPE PR850A
		名称 AC電源ユニット
DRAWN T.Y / APPROVED July 15 '94 IKEDA	RC1500-1T	NAME AC POWER UNIT
SCALE / MASS kg	APPLICABLE TO: (MODEL) / BLOCK NO.	DWG NO. C5519-K24- A

FREQUENCY TABLES

DSC & DISTRESS FREQUENCIES

CH. No.	TX	RX	Mode	ITU Ch. No.	Remarks
DSC 1	2182.0	2182.0	USB		DISTRESS
DSC 2	4125.0	4125.0	USB		DISTRESS
DSC 3	6215.0	6215.0	USB		DISTRESS
DSC 4	8291.0	8291.0	USB		DISTRESS
DSC 5	12290.0	12290.0	USB		DISTRESS
DSC 6	16420.0	16420.0	USB		DISTRESS
DSC 7		500.0	AM		DISTRESS
DSC 8	3023.0	3023.0	USB		DISTRESS
DSC 9	5680.0	5680.0	USB		DISTRESS
DSC 11	2187.5	2187.5	TLX		DSC
DSC 12	4207.5	4207.5	TLX	4030	DSC
DSC 13	6312.0	6312.0	TLX	6058	DSC
DSC 14	8414.5	8414.5	TLX	8077	DSC
DSC 15	12577.0	12577.0	TLX	12191	DSC
DSC 16	16804.5	16804.5	TLX	16233	DSC
DSC 21	2174.5	2174.5	TLX		
DSC 22	4177.5	4177.5	TLX	4011	
DSC 23	6268.0	6268.0	TLX	6011	
DSC 24	8376.5	8376.5	TLX	8001	
DSC 25	12520.0	12520.0	TLX	12087	
DSC 26	16695.0	16695.0	TLX	16024	
DSC 30	490.0	490.0	TLX		NAV.
DSC 31	518.0	518.0	TLX		NAV.
DSC 32	4209.5	4209.5	TLX		NAV.
DSC 42	4210.0	4210.0	TLX		MSI
DSC 43	6314.0	6314.0	TLX		MSI
DSC 44	8416.5	8416.5	TLX		MSI
DSC 45	12579.0	12579.0	TLX		MSI
DSC 46	16806.5	16806.5	TLX		MSI
DSC 47	19680.5	19680.5	TLX		MSI
DSC 48	22376.0	22376.0	TLX		MSI
DSC 49	26100.5	26100.5	TLX		M
DSC 50	458.5	455.5	TLX		DSC
DSC 51	2189.5	2177.0	TLX		DSC
DSC 52	4208.0	4219.5	TLX	4031	DSC
DSC 53	6312.5	6331.0	TLX	6059	DSC
DSC 54	8415.0	8436.5	TLX	8078	DSC
DSC 55	12577.5	12657.0	TLX	12192	DSC
DSC 56	16805.0	16903.0	TLX	16234	DSC
DSC 57	18898.5	19703.5	TLX	18057	DSC
DSC 58	22374.5	22444.0	TLX	22181	DSC
DSC 59	25208.5	26121.0	TLX	25072	DSC
DSC 61	2177.0	2177.0	TLX		Intership
DSC 62	4208.5	4220.0	TLX	4032	DSC
DSC 63	6313.0	6331.5	TLX	6060	DSC
DSC 64	8415.5	8437.0	TLX	8079	DSC
DSC 65	12578.0	12657.5	TLX	12193	DSC
DSC 66	16805.5	16903.5	TLX	16235	DSC
DSC 67	18899.0	19704.0	TLX	18058	DSC
DSC 68	22375.0	22444.5	TLX	22182	DSC
DSC 69	25209.0	26121.5	TLX	25073	DSC
DSC 72	4209.0	4220.5	TLX	4033	DSC
DSC 73	6313.5	6332.0	TLX	6061	DSC
DSC 74	8416.0	8437.5	TLX	8080	DSC
DSC 75	12578.5	12658.0	TLX	12194	DSC
DSC 76	16806.0	16904.0	TLX	16236	DSC
DSC 77	18899.5	19704.5	TLX	18059	DSC
DSC 78	22375.5	22445.0	TLX	22183	DSC
DSC 79	25209.5	26122.0	TLX	25074	DSC

FURUNO

ITU SSB FREQUENCY TABLE FOR FURUNO SSB RADIOTELEPHONES

1991/10 ITUSSB

1 — 4 MHz BAND

No.	TX	RX
300	3023	3023
400	4125	4125
500	5680	5680
401	4065	4357
402	4068	4360
403	4071	4363
404	4074	4366
405	4077	4369
406	4080	4372
407	4083	4375
408	4086	4378
409	4089	4381
410	4092	4384
411	4095	4387
412	4098	4390
413	4101	4393
414	4104	4396
415	4107	4399
416	4110	4402
417	4113	4405
418	4116	4408
419	4119	4411
420	4122	4414
421	4125	4417
422	4128	4420
423	4131	4423
424	4134	4426
425	4137	4429
426	4140	4432
427	4143	4435
428	4351	4351
429	4354	4354
430	4146	4146
431	4149	4149
432	4000	4000
433	4003	4003
434	4006	4006
435	4009	4009
436	4012	4012
437	4015	4015
438	4018	4018
439	4021	4021
440	4024	4024
441	4027	4027
442	4030	4030
443	4033	4033
444	4036	4036
445	4039	4039
446	4042	4042
447	4045	4045
448	4048	4048
449	4051	4051
450	4054	4054
451	4057	4057
452	4060	4060

2 — 6 MHz BAND

No.	TX	RX
600	6215	6215
601	6200	6501
602	6203	6504
603	6206	6507
604	6209	6510
605	6212	6513
606	6215	6516
607	6218	6519
608	6221	6522
609	6224	6224
610	6227	6227
611	6230	6230

8 MHz BAND

No.	TX	RX
800	8291	8291
801	8195	8719
802	8198	8722
803	8201	8725
804	8204	8728
805	8207	8731
806	8210	8734
807	8213	8737
808	8216	8740
809	8219	8743
810	8222	8746
811	8225	8749
812	8228	8752
813	8231	8755
814	8234	8758
815	8237	8761
816	8240	8764
817	8243	8767
818	8246	8770
819	8249	8773
820	8252	8776
821	8255	8779
822	8258	8782
823	8261	8785
824	8264	8788
825	8267	8791
826	8270	8794
827	8273	8797
828	8276	8800
829	8279	8803
830	8282	8806
831	8285	8809
832	8288	8812
833	8291	8291
834	8707	8707
835	8710	8710
836	8713	8713
837	8716	8716
838	8294	8294
839	8297	8297
840	8101	8101
841	8104	8104
842	8107	8107
843	8110	8110
844	8113	8113
845	8116	8116
846	8119	8119
847	8122	8122
848	8125	8125
849	8128	8128
850	8131	8131
851	8134	8134
852	8137	8137
853	8140	8140
854	8143	8143
855	8146	8146
856	8149	8149
857	8152	8152
858	8155	8155
859	8158	8158
860	8161	8161
861	8164	8164
862	8167	8167
863	8170	8170
864	8173	8173
865	8176	8176
866	8179	8179
867	8182	8182
868	8185	8185
869	8188	8188
870	8191	8191

3 — 12 MHz BAND

No.	TX	RX
1200	12290	12290
1201	12230	13077
1202	12233	13080
1203	12236	13083
1204	12239	13086
1205	12242	13089
1206	12245	13092
1207	12248	13095
1208	12251	13098
1209	12254	13101
1210	12257	13104
1211	12260	13107
1212	12263	13110
1213	12266	13113
1214	12269	13116
1215	12272	13119
1216	12275	13122
1217	12278	13125
1218	12281	13128
1219	12284	13131
1220	12287	13134
1221	12290	13137
1222	12293	13140
1223	12296	13143
1224	12299	13146
1225	12302	13149
1226	12305	13152
1227	12308	13155
1228	12311	13158
1229	12314	13161
1230	12317	13164
1231	12320	13167
1232	12323	13170
1233	12326	13173
1234	12329	13176
1235	12332	13179
1236	12335	13182
1237	12338	13185
1238	12341	13188
1239	12344	13191
1240	12347	13194
1241	12350	13197
1242	12353	12353
1243	12356	12356
1244	12359	12359
1245	12362	12362
1246	12365	12365

4 — 16 MHz BAND

No.	TX	RX
1600	16420	16420
1601	16360	17242
1602	16363	17245
1603	16366	17248
1604	16369	17251
1605	16372	17254
1606	16375	17257
1607	16378	17260
1608	16381	17263
1609	16384	17266
1610	16387	17269
1611	16390	17272
1612	16393	17275
1613	16396	17278
1614	16399	17281
1615	16402	17284
1616	16405	17287
1617	16408	17290
1618	16411	17293
1619	16414	17296
1620	16417	17299
1621	16420	17302
1622	16423	17305
1623	16426	17308
1624	16429	17311
1625	16432	17314
1626	16435	17317
1627	16438	17320
1628	16441	17323
1629	16444	17326
1630	16447	17329
1631	16450	17332
1632	16453	17335
1633	16456	17338
1634	16459	17341
1635	16462	17344
1636	16465	17347
1637	16468	17350
1638	16471	17353
1639	16474	17356
1640	16477	17359
1641	16480	17362
1642	16483	17365
1643	16486	17368
1644	16489	17371
1645	16492	17374
1646	16495	17377
1647	16498	17380
1648	16501	17383
1649	16504	17386
1650	16507	17389
1651	16510	17392
1652	16513	17395
1653	16516	17398
1654	16519	17401
1655	16522	17404
1656	16525	17407
1657	16528	16528
1658	16531	16531
1659	16534	16534
1660	16537	16537
1661	16540	16540
1662	16543	16543
1663	16546	16546

5 — 18/19 MHz BAND

No.	TX	RX
1801	18780	19755
1802	18783	19758
1803	18786	19761
1804	18789	19764
1805	18792	19767
1806	18795	19770
1807	18798	19773
1808	18801	19776
1809	18804	19779
1810	18807	19782
1811	18810	19785
1812	18813	19788
1813	18816	19791
1814	18819	19794
1815	18822	19797
1816	18825	18825
1817	18828	18828
1818	18831	18831
1819	18834	18834
1820	18837	18837
1821	18840	18840
1822	18843	18843

6 — 22 MHz BAND

No.	TX	RX
2201	22000	22696
2202	22003	22699
2203	22006	22702
2204	22009	22705
2205	22012	22708
2206	22015	22711
2207	22018	22714
2208	22021	22717
2209	22024	22720
2210	22027	22723
2211	22030	22726
2212	22033	22729
2213	22036	22732
2214	22039	22735
2215	22042	22738
2216	22045	22741
2217	22048	22744
2218	22051	22747
2219	22054	22750
2220	22057	22753
2221	22060	22756
2222	22063	22759
2223	22066	22762
2224	22069	22765
2225	22072	22768
2226	22075	22771
2227	22078	22774
2228	22081	22777
2229	22084	22780
2230	22087	22783
2231	22090	22786
2232	22093	22789
2233	22096	22792
2234	22099	22795
2235	22102	22798
2236	22105	22801
2237	22108	22804
2238	22111	22807
2239	22114	22810
2240	22117	22813
2241	22120	22816
2242	22123	22819
2243	22126	22822
2244	22129	22825
2245	22132	22828
2246	22135	22831
2247	22138	22834
2248	22141	22837
2249	22144	22840
2250	22147	22843
2251	22150	22846
2252	22153	22849
2253	22156	22852
2254	22159	22159
2255	22162	22162
2256	22165	22165
2257	22168	22168
2258	22171	22171
2259	22174	22174
2260	22177	22177

25/26 MHz BAND

No.	TX	RX
2501	25070	26145
2502	25073	26148
2503	25076	26151
2504	25079	26154
2505	25082	26157
2506	25085	26160
2507	25088	26163
2508	25091	26166
2509	25094	26169
2510	25097	26172
2511	25100	25100
2512	25103	25103
2513	25106	25106
2514	25109	25109
2515	25112	25112
2516	25115	25115
2517	25118	25118

FURUNO ELECTRIC CO., LTD.

FURUNO ITU TELEX FREQUENCY TABLE (effective from July 1, 1991, 1991年7月1日より発効)

4 MHz BAND			6 MHz BAND			8 MHz BAND			12 MHz BAND			16 MHz BAND			18/19 MHz BAND			22 MHz BAND			25/26 MHz BAND		
No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX
4001	4172.5	4210.5	6001	6263.0	6314.5	8001	8376.5	8376.5	12001	12477.0	12579.5	16001	16683.5	16807.0	18001	18870.5	19681.0	22001	22284.5	22376.5	25001	25173.0	26101.0
4002	4173.0	4211.0	6002	6263.5	6315.0	8002	8377.0	8417.0	12002	12477.5	12580.0	16002	16684.0	16807.5	18002	18871.0	19681.5	22002	22285.0	22377.0	25002	25173.5	26101.5
4003	4173.5	4211.5	6003	6264.0	6315.5	8003	8377.5	8417.5	12003	12478.0	12580.5	16003	16684.5	16808.0	18003	18871.5	19682.0	22003	22285.5	22377.5	25003	25174.0	26102.0
4004	4174.0	4212.0	6004	6264.5	6316.0	8004	8378.0	8418.0	12004	12478.5	12581.0	16004	16685.0	16808.5	18004	18872.0	19682.5	22004	22286.0	22378.0	25004	25174.5	26102.5
4005	4174.5	4212.5	6005	6265.0	6316.5	8005	8378.5	8418.5	12005	12479.0	12581.5	16005	16685.5	16809.0	18005	18872.5	19683.0	22005	22286.5	22378.5	25005	25175.0	26103.0
4006	4175.0	4213.0	6006	6265.5	6317.0	8006	8379.0	8419.0	12006	12479.5	12582.0	16006	16686.0	16809.5	18006	18873.0	19683.5	22006	22287.0	22379.0	25006	25175.5	26103.5
4007	4175.5	4213.5	6007	6266.0	6317.5	8007	8379.5	8419.5	12007	12480.0	12582.5	16007	16686.5	16810.0	18007	18873.5	19684.0	22007	22287.5	22379.5	25007	25176.0	26104.0
4008	4176.0	4214.0	6008	6266.5	6318.0	8008	8380.0	8420.0	12008	12480.5	12583.0	16008	16687.0	16810.5	18008	18874.0	19684.5	22008	22288.0	22380.0	25008	25176.5	26104.5
4009	4176.5	4214.5	6009	6267.0	6318.5	8009	8380.5	8420.5	12009	12481.0	12583.5	16009	16687.5	16811.0	18009	18874.5	19685.0	22009	22288.5	22380.5	25009	25177.0	26105.0
4010	4177.0	4215.0	6010	6267.5	6319.0	8010	8381.0	8421.0	12010	12481.5	12584.0	16010	16688.0	16811.5	18010	18875.0	19685.5	22010	22289.0	22381.0	25010	25177.5	26105.5
4011	4177.5	4177.5	6011	6268.0	6268.0	8011	8381.5	8421.5	12011	12482.0	12584.5	16011	16688.5	16812.0	18011	18875.5	19686.0	22011	22289.5	22381.5	25011	25178.0	26106.0
4012	4178.0	4215.5	6012	6268.5	6319.5	8012	8382.0	8422.0	12012	12482.5	12585.0	16012	16689.0	16812.5	18012	18876.0	19686.5	22012	22290.0	22382.0	25012	25178.5	26106.5
4013	4178.5	4216.0	6013	6269.0	6320.0	8013	8382.5	8422.5	12013	12483.0	12585.5	16013	16689.5	16813.0	18013	18876.5	19687.0	22013	22290.5	22382.5	25013	25179.0	26107.0
4014	4179.0	4216.5	6014	6269.5	6320.5	8014	8383.0	8423.0	12014	12483.5	12586.0	16014	16690.0	16813.5	18014	18877.0	19687.5	22014	22291.0	22383.0	25014	25179.5	26107.5
4015	4179.5	4217.0	6015	6270.0	6321.0	8015	8383.5	8423.5	12015	12484.0	12586.5	16015	16690.5	16814.0	18015	18877.5	19688.0	22015	22291.5	22383.5	25015	25180.0	26108.0
4016	4180.0	4217.5	6016	6270.5	6321.5	8016	8384.0	8424.0	12016	12484.5	12587.0	16016	16691.0	16814.5	18016	18878.0	19688.5	22016	22292.0	22384.0	25016	25180.5	26108.5
4017	4180.5	4218.0	6017	6271.0	6322.0	8017	8384.5	8424.5	12017	12485.0	12587.5	16017	16691.5	16815.0	18017	18878.5	19689.0	22017	22292.5	22384.5	25017	25181.0	26109.0
4018	4181.0	4218.5	6018	6271.5	6322.5	8018	8385.0	8425.0	12018	12485.5	12588.0	16018	16692.0	16815.5	18018	18879.0	19689.5	22018	22293.0	22385.0	25018	25181.5	26109.5
4019	4181.5	4219.0	6019	6272.0	6323.0	8019	8385.5	8425.5	12019	12486.0	12588.5	16019	16692.5	16816.0	18019	18879.5	19690.0	22019	22293.5	22385.5	25019	25182.0	26110.0
4020	4202.5	4202.5	6020	6272.5	6323.5	8020	8386.0	8426.0	12020	12486.5	12589.0	16020	16693.0	16816.5	18020	18880.0	19690.5	22020	22294.0	22386.0	25020	25182.5	26110.5
4021	4203.0	4203.0	6021	6273.0	6324.0	8021	8386.5	8426.5	12021	12487.0	12589.5	16021	16693.5	16817.0	18021	18880.5	19691.0	22021	22294.5	22386.5	25021	25183.0	26111.0
4022	4203.5	4203.5	6022	6273.5	6324.5	8022	8387.0	8427.0	12022	12487.5	12590.0	16022	16694.0	16817.5	18022	18881.0	19691.5	22022	22295.0	22387.0	25022	25183.5	26111.5
4023	4204.0	4204.0	6023	6274.0	6325.0	8023	8387.5	8427.5	12023	12488.0	12590.5	16023	16694.5	16818.0	18023	18881.5	19692.0	22023	22295.5	22387.5	25023	25184.0	26112.0
4024	4204.5	4204.5	6024	6274.5	6325.5	8024	8388.0	8428.0	12024	12488.5	12591.0	16024	16695.0	16695.0	18024	18882.0	19692.5	22024	22296.0	22388.0	25024	25184.5	26112.5
4025	4205.0	4205.0	6025	6275.0	6326.0	8025	8388.5	8428.5	12025	12489.0	12591.5	16025	16695.5	16818.5	18025	18882.5	19693.0	22025	22296.5	22388.5	25025	25185.0	26113.0
4026	4205.5	4205.5	6026	6275.5	6326.5	8026	8389.0	8429.0	12026	12489.5	12592.0	16026	16696.0	16819.0	18026	18883.0	19693.5	22026	22297.0	22389.0	25026	25185.5	26113.5
4027	4206.0	4206.0	6027	6281.0	6327.0	8027	8389.5	8429.5	12027	12490.0	12592.5	16027	16696.5	16819.5	18027	18883.5	19694.0	22027	22297.5	22389.5	25027	25186.0	26114.0
4028	4206.5	4206.5	6028	6281.5	6327.5	8028	8390.0	8430.0	12028	12490.5	12593.0	16028	16697.0	16820.0	18028	18884.0	19694.5	22028	22298.0	22390.0	25028	25186.5	26114.5
4029	4207.0	4207.0	6029	6282.0	6328.0	8029	8390.5	8430.5	12029	12491.0	12593.5	16029	16697.5	16820.5	18029	18884.5	19695.0	22029	22298.5	22390.5	25029	25187.0	26115.0
4030	4207.5	4207.5	6030	6282.5	6328.5	8030	8391.0	8431.0	12030	12491.5	12594.0	16030	16698.0	16821.0	18030	18885.0	19695.5	22030	22299.0	22391.0	25030	25187.5	26115.5
4031	4208.0	4219.5	6031	6283.0	6329.0	8031	8391.5	8431.5	12031	12492.0	12594.5	16031	16698.5	16821.5	18031	18885.5	19696.0	22031	22299.5	22391.5	25031	25188.0	26116.0
4032	4208.5	4220.0	6032	6283.5	6329.5	8032	8392.0	8432.0	12032	12492.5	12595.0	16032	16699.0	16822.0	18032	18886.0	19696.5	22032	22300.0	22392.0	25032	25188.5	26116.5
4033	4209.0	4220.5	6033	6284.0	6330.0	8033	8392.5	8432.5	12033	12493.0	12595.5	16033	16699.5	16822.5	18033	18886.5	19697.0	22033	22300.5	22392.5	25033	25189.0	26117.0
			6034	6284.5	6330.5	8034	8393.0	8433.0	12034	12493.5	12596.0	16034	16700.0	16823.0	18034	18887.0	19697.5	22034	22301.0	22393.0	25034	25189.5	26117.5
			6035	6300.5	6300.5	8035	8393.5	8433.5	12035	12494.0	12596.5	16035	16700.5	16823.5	18035	18887.5	19698.0	22035	22301.5	22393.5	25035	25190.0	26118.0
			6036	6301.0	6301.0	8036	8394.0	8434.0	12036	12494.5	12597.0	16036	16701.0	16824.0	18036	18888.0	19698.5	22036	22302.0	22394.0	25036	25190.5	26118.5
			6037	6301.5	6301.5	8037	8394.5	8434.5	12037	12495.0	12597.5	16037	16701.5	16824.5	18037	18888.5	19699.0	22037	22302.5	22394.5	25037	25191.0	26119.0
			6038	6302.0	6302.0	8038	8395.0	8435.0	12038	12495.5	12598.0	16038	16702.0	16825.0	18038	18889.0	19699.5	22038	22303.0	22395.0	25038	25191.5	26119.5
			6039	6302.5	6302.5	8039	8395.5	8435.5	12039	12496.0	12598.5	16039	16702.5	16825.5	18039	18889.5	19700.0	22039	22303.5	22395.5	25039	25192.0	26120.0
			6040	6303.0	6303.0	8040	8396.0	8436.0	12040	12496.5	12599.0	16040	16703.0	16826.0	18040	18890.0	19700.5	22040	22304.0	22396.0	25040	25192.5	26120.5
			6041	6303.5	6303.5	8041	8396.5	8396.5	12041	12497.0	12599.5	16041	16703.5	16826.5	18041	18890.5	19701.0	22041	22304.5	22396.5	25041	25193.0	25193.0
			6042	6304.0	6304.0	8042	8397.0	8397.0	12042	12497.5	12600.0	16042	16704.0	16827.0	18042	18891.0	19701.5	22042	22305.0	22397.0	25042	25193.5	25193.5
			6043	6304.5	6304.5	8043	8397.5	8397.5	12043	12498.0	12600.5	16043	16704.5	16827.5	18043	18891.5	19702.0	22043	22305.5	22397.5	25043	25194.0	25194.0
			6044	6305.0	6305.0	8044	8398.0	8398.0	12044	12498.5	12601.0	16044	16705.0	16828.0	18044	18892.0	19702.5	22044	22306.0	22398.0	25044	25194.5	25194.5
			6045	6305.5	6305.5	8045	8398.5	8398.5	12045	12499.0	12601.5	16045	16705.5	16828.5	18045	18892.5	19703.0	22045	22306.5	22398.5	25045	25195.0	25195.0
			6046	6306.0	6306.0	8046	8399.0	8399.0	12046	12499.5	12602.0	16046	16706.0	16829.0	18046	18893.0	18893.0	22046	22307.0	22399.0	25046	25195.5	25195.5
			6047	6306.5	6306.5	8047	8399.5	8399.5	12047	12500.0	12602.5	16047	16706.5	16829.5	18047	18893.5	18893.5	22047	22307.5	22399.5	25047	25196.0	25196.0
			6048	6307.0	6307.0	8048	8400.0	8400.0	12048	12500.5	12603.0	16048	16707.0	16830.0	18048	18894.0	18894.0	22048	22308.0	22400.0	25048	25196.5	25196.5
			6049	6307.5	6307.5	8049	8400.5	8400.5	12049	12501.0	12603.5	16049	16707.5	16830.5	18049	18894.5	18894.5	22049	22308.5	22400.5	25049	25197.0	25197.0
			6050	6308.0	6308.0	8050	8401.0	8401.0	12050	12501.5	12604.0	16050	16708.0	16831.0	18050	18895.0	18895.0	22050	22309.0	22401.0	25050	25197.5	25197.5
			6051	6308.5	6308.5	8051	8401.5	8401.5	12051	12502.0	12604.5	16051	16708.5	16831.5	18051	18895.5	18895.5	22051	22309.5	22401.5	25051	25198.0	25198.0
			6052	6309.0	6309.0	8052	8402.0	8402.0	12052	12502.5	12605.0	16052	16709.0	16832.0	18052	18896.0	18896.0	22052	22310.0	22402.0	25052	25198.5	25198.5
			6053	6309.5	6309.5	8053	8402.5	8402.5	12053	12503.0	12605.5	16053	16709.5	16832.5	18053	18896.5	18896.5	22053	22310.5	22402.5	25053	25199.0	25199.0
			6054	6310.0	6310.0	8054	8403.0	8403.0	12054	12503.5	12606.0	16054	16710.0	16833.0	18054	18897.0	18897.0	22054	22311.0	22403.0	25054	25199.5	25199.5
			6055	6310.5	6310.5	8055	8403.5	8403.5	12055	12504.0	12606.5	16055	16710.5	16833.5	18055	18897.5	18897.5	22055	22311.5	22403.5	25055	25200.0	25200.0

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6056	6311.0	6311.0	8056	8404.0	8404.0	12056	12504.5	12607.0	16056	16711.0	16834.0	18056	18898.0	18898.0	22056	22312.0	22404.0	25056	25200.5	25200.5
6057	6311.5	6311.5	8057	8404.5	8404.5	12057	12505.0	12607.5	16057	16711.5	16834.5	18057	18898.5	19703.5	22057	22312.5	22404.5	25057	25201.0	25201.0
6058	6312.0	6312.0	8058	8405.0	8405.0	12058	12505.5	12608.0	16058	16712.0	16835.0	18058	18899.0	19704.0	22058	22313.0	22405.0	25058	25201.5	25201.5
6059	6312.5	6331.0	8059	8405.5	8405.5	12059	12506.0	12608.5	16059	16712.5	16835.5	18059	18899.5	19704.5	22059	22313.5	22405.5	25059	25202.0	25202.0
6060	6313.0	6331.5	8060	8406.0	8406.0	12060	12506.5	12609.0	16060	16713.0	16836.0				22060	22314.0	22406.0	25060	25202.5	25202.5
6061	6313.5	6332.0	8061	8406.5	8406.5	12061	12507.0	12609.5	16061	16713.5	16836.5				22061	22314.5	22406.5	25061	25203.0	25203.0
			8062	8407.0	8407.0	12062	12507.5	12610.0	16062	16714.0	16837.0				22062	22315.0	22407.0	25062	25203.5	25203.5
			8063	8407.5	8407.5	12063	12508.0	12610.5	16063	16714.5	16837.5				22063	22315.5	22407.5	25063	25204.0	25204.0
			8064	8408.0	8408.0	12064	12508.5	12611.0	16064	16715.0	16838.0				22064	22316.0	22408.0	25064	25204.5	25204.5
			8065	8408.5	8408.5	12065	12509.0	12611.5	16065	16715.5	16838.5				22065	22316.5	22408.5	25065	25205.0	25205.0
			8066	8409.0	8409.0	12066	12509.5	12612.0	16066	16716.0	16839.0				22066	22317.0	22409.0	25066	25205.5	25205.5
			8067	8409.5	8409.5	12067	12510.0	12612.5	16067	16716.5	16839.5				22067	22317.5	22409.5	25067	25206.0	25206.0
			8068	8410.0	8410.0	12068	12510.5	12613.0	16068	16717.0	16840.0				22068	22318.0	22410.0	25068	25206.5	25206.5
			8069	8410.5	8410.5	12069	12511.0	12613.5	16069	16717.5	16840.5				22069	22318.5	22410.5	25069	25207.0	25207.0
			8070	8411.0	8411.0	12070	12511.5	12614.0	16070	16718.0	16841.0				22070	22319.0	22411.0	25070	25207.5	25207.5
			8071	8411.5	8411.5	12071	12512.0	12614.5	16071	16718.5	16841.5				22071	22319.5	22411.5	25071	25208.0	25208.0
			8072	8412.0	8412.0	12072	12512.5	12615.0	16072	16719.0	16842.0				22072	22320.0	22412.0	25072	25208.5	26121.0
			8073	8412.5	8412.5	12073	12513.0	12615.5	16073	16719.5	16842.5				22073	22320.5	22412.5	25073	25209.0	26121.5
			8074	8413.0	8413.0	12074	12513.5	12616.0	16074	16720.0	16843.0				22074	22321.0	22413.0	25074	25209.5	26122.0
			8075	8413.5	8413.5	12075	12514.0	12616.5	16075	16720.5	16843.5				22075	22321.5	22413.5			
			8076	8414.0	8414.0	12076	12514.5	12617.0	16076	16721.0	16844.0				22076	22322.0	22414.0			
			8077	8414.5	8414.5	12077	12515.0	12617.5	16077	16721.5	16844.5				22077	22322.5	22414.5			
			8078	8415.0	8436.5	12078	12515.5	12618.0	16078	16722.0	16845.0				22078	22323.0	22415.0			
			8079	8415.5	8437.0	12079	12516.0	12618.5	16079	16722.5	16845.5				22079	22323.5	22415.5			
			8080	8416.0	8437.5	12080	12516.5	12619.0	16080	16723.0	16846.0				22080	22324.0	22416.0			
						12081	12517.0	12619.5	16081	16723.5	16846.5				22081	22324.5	22416.5			
						12082	12517.5	12620.0	16082	16724.0	16847.0				22082	22325.0	22417.0			
						12083	12518.0	12620.5	16083	16724.5	16847.5				22083	22325.5	22417.5			
						12084	12518.5	12621.0	16084	16725.0	16848.0				22084	22326.0	22418.0			
						12085	12519.0	12621.5	16085	16725.5	16848.5				22085	22326.5	22418.5			
						12086	12519.5	12622.0	16086	16726.0	16849.0				22086	22327.0	22419.0			
						12087	12520.0	12520.0	16087	16726.5	16849.5				22087	22327.5	22419.5			
						12088	12520.5	12622.5	16088	16727.0	16850.0				22088	22328.0	22420.0			
						12089	12521.0	12623.0	16089	16727.5	16850.5				22089	22328.5	22420.5			
						12090	12521.5	12623.5	16090	16728.0	16851.0				22090	22329.0	22421.0			
						12091	12522.0	12624.0	16091	16728.5	16851.5				22091	22329.5	22421.5			
						12092	12522.5	12624.5	16092	16729.0	16852.0				22092	22330.0	22422.0			
						12093	12523.0	12625.0	16093	16729.5	16852.5				22093	22330.5	22422.5			
						12094	12523.5	12625.5	16094	16730.0	16853.0				22094	22331.0	22423.0			
						12095	12524.0	12626.0	16095	16730.5	16853.5				22095	22331.5	22423.5			
						12096	12524.5	12626.5	16096	16731.0	16854.0				22096	22332.0	22424.0			
						12097	12525.0	12627.0	16097	16731.5	16854.5				22097	22332.5	22424.5			
						12098	12525.5	12627.5	16098	16732.0	16855.0				22098	22333.0	22425.0			
						12099	12526.0	12628.0	16099	16732.5	16855.5				22099	22333.5	22425.5			
						12100	12526.5	12628.5	16100	16733.0	16856.0				22100	22334.0	22426.0			
						12101	12527.0	12629.0	16101	16733.5	16856.5				22101	22334.5	22426.5			
						12102	12527.5	12629.5	16102	16739.0	16857.0				22102	22335.0	22427.0			
						12103	12528.0	12630.0	16103	16739.5	16857.5				22103	22335.5	22427.5			
						12104	12528.5	12630.5	16104	16740.0	16858.0				22104	22336.0	22428.0			
						12105	12529.0	12631.0	16105	16740.5	16858.5				22105	22336.5	22428.5			
						12106	12529.5	12631.5	16106	16741.0	16859.0				22106	22337.0	22429.0			
						12107	12530.0	12632.0	16107	16741.5	16859.5				22107	22337.5	22429.5			
						12108	12530.5	12632.5	16108	16742.0	16860.0				22108	22338.0	22430.0			
						12109	12531.0	12633.0	16109	16742.5	16860.5				22109	22338.5	22430.5			
						12110	12531.5	12633.5	16110	16743.0	16861.0				22110	22339.0	22431.0			
						12111	12532.0	12634.0	16111	16743.5	16861.5				22111	22339.5	22431.5			
						12112	12532.5	12634.5	16112	16744.0	16862.0				22112	22340.0	22432.0			
						12113	12533.0	12635.0	16113	16744.5	16862.5				22113	22340.5	22432.5			
						12114	12533.5	12635.5	16114	16745.0	16863.0				22114	22341.0	22433.0			
						12115	12534.0	12636.0	16115	16745.5	16863.5				22115	22341.5	22433.5			

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									12116	12534.5	12636.5	16116	16746.0	16864.0				22116	22342.0	22434.0			
									12117	12535.0	12637.0	16117	16746.5	16864.5				22117	22342.5	22434.5			
									12118	12535.5	12637.5	16118	16747.0	16865.0				22118	22343.0	22435.0			
									12119	12536.0	12638.0	16119	16747.5	16865.5				22119	22343.5	22435.5			
									12120	12536.5	12638.5	16120	16748.0	16866.0				22120	22344.0	22436.0			
									12121	12537.0	12639.0	16121	16748.5	16866.5				22121	22344.5	22436.5			
									12122	12537.5	12639.5	16122	16749.0	16867.0				22122	22345.0	22437.0			
									12123	12538.0	12640.0	16123	16749.5	16867.5				22123	22345.5	22437.5			
									12124	12538.5	12640.5	16124	16750.0	16868.0				22124	22346.0	22438.0			
									12125	12539.0	12641.0	16125	16750.5	16868.5				22125	22346.5	22438.5			
									12126	12539.5	12641.5	16126	16751.0	16869.0				22126	22347.0	22439.0			
									12127	12540.0	12642.0	16127	16751.5	16869.5				22127	22347.5	22439.5			
									12128	12540.5	12642.5	16128	16752.0	16870.0				22128	22348.0	22440.0			
									12129	12541.0	12643.0	16129	16752.5	16870.5				22129	22348.5	22440.5			
									12130	12541.5	12643.5	16130	16753.0	16871.0				22130	22349.0	22441.0			
									12131	12542.0	12644.0	16131	16753.5	16871.5				22131	22349.5	22441.5			
									12132	12542.5	12644.5	16132	16754.0	16872.0				22132	22350.0	22442.0			
									12133	12543.0	12645.0	16133	16754.5	16872.5				22133	22350.5	22442.5			
									12134	12543.5	12645.5	16134	16755.0	16873.0				22134	22351.0	22443.0			
									12135	12544.0	12646.0	16135	16755.5	16873.5				22135	22351.5	22443.5			
									12136	12544.5	12646.5	16136	16756.0	16874.0				22136	22352.0	22352.0			
									12137	12545.0	12647.0	16137	16756.5	16874.5				22137	22352.5	22352.5			
									12138	12545.5	12647.5	16138	16757.0	16875.0				22138	22353.0	22353.0			
									12139	12546.0	12648.0	16139	16757.5	16875.5				22139	22353.5	22353.5			
									12140	12546.5	12648.5	16140	16758.0	16876.0				22140	22354.0	22354.0			
									12141	12547.0	12649.0	16141	16758.5	16876.5				22141	22354.5	22354.5			
									12142	12547.5	12649.5	16142	16759.0	16877.0				22142	22355.0	22355.0			
									12143	12548.0	12650.0	16143	16759.5	16877.5				22143	22355.5	22355.5			
									12144	12548.5	12650.5	16144	16760.0	16878.0				22144	22356.0	22356.0			
									12145	12549.0	12651.0	16145	16760.5	16878.5				22145	22356.5	22356.5			
									12146	12549.5	12651.5	16146	16761.0	16879.0				22146	22357.0	22357.0			
									12147	12555.0	12652.0	16147	16761.5	16879.5				22147	22357.5	22357.5			
									12148	12555.5	12652.5	16148	16762.0	16880.0				22148	22358.0	22358.0			
									12149	12556.0	12653.0	16149	16762.5	16880.5				22149	22358.5	22358.5			
									12150	12556.5	12653.5	16150	16763.0	16881.0				22150	22359.0	22359.0			
									12151	12557.0	12654.0	16151	16763.5	16881.5				22151	22359.5	22359.5			
									12152	12557.5	12654.5	16152	16764.0	16882.0				22152	22360.0	22360.0			
									12153	12558.0	12655.0	16153	16764.5	16882.5				22153	22360.5	22360.5			
									12154	12558.5	12655.5	16154	16765.0	16883.0				22154	22361.0	22361.0			
									12155	12559.0	12656.0	16155	16765.5	16883.5				22155	22361.5	22361.5			
									12156	12559.5	12656.5	16156	16766.0	16884.0				22156	22362.0	22362.0			
									12157	12560.0	12560.0	16157	16766.5	16884.5				22157	22362.5	22362.5			
									12158	12560.5	12560.5	16158	16767.0	16885.0				22158	22363.0	22363.0			
									12159	12561.0	12561.0	16159	16767.5	16885.5				22159	22363.5	22363.5			
									12160	12561.5	12561.5	16160	16768.0	16886.0				22160	22364.0	22364.0			
									12161	12562.0	12562.0	16161	16768.5	16886.5				22161	22364.5	22364.5			
									12162	12562.5	12562.5	16162	16769.0	16887.0				22162	22365.0	22365.0			
									12163	12563.0	12563.0	16163	16769.5	16887.5				22163	22365.5	22365.5			
									12164	12563.5	12563.5	16164	16770.0	16888.0				22164	22366.0	22366.0			
									12165	12564.0	12564.0	16165	16770.5	16888.5				22165	22366.5	22366.5			
									12166	12564.5	12564.5	16166	16771.0	16889.0				22166	22367.0	22367.0			
									12167	12565.0	12565.0	16167	16771.5	16889.5				22167	22367.5	22367.5			
									12168	12565.5	12565.5	16168	16772.0	16890.0				22168	22368.0	22368.0			
									12169	12566.0	12566.0	16169	16772.5	16890.5				22169	22368.5	22368.5			
									12170	12566.5	12566.5	16170	16773.0	16891.0				22170	22369.0	22369.0			
									12171	12567.0	12567.0	16171	16773.5	16891.5				22171	22369.5	22369.5			
									12172	12567.5	12567.5	16172	16774.0	16892.0				22172	22370.0	22370.0			
									12173	12568.0	12568.0	16173	16774.5	16892.5				22173	22370.5	22370.5			
									12174	12568.5	12568.5	16174	16775.0	16893.0				22174	22371.0	22371.0			
									12175	12569.0	12569.0	16175	16775.5	16893.5				22175	22371.5	22371.5			

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12176	12569.5	12569.5	16176	16776.0	16894.0	22176	22372.0	22372.0
12177	12570.0	12570.0	16177	16776.5	16894.5	22177	22372.5	22372.5
12178	12570.5	12570.5	16178	16777.0	16895.0	22178	22373.0	22373.0
12179	12571.0	12571.0	16179	16777.5	16895.5	22179	22373.5	22373.5
12180	12571.5	12571.5	16180	16778.0	16896.0	22180	22374.0	22374.0
12181	12572.0	12572.0	16181	16778.5	16896.5	22181	22374.5	22444.0
12182	12572.5	12572.5	16182	16779.0	16897.0	22182	22375.0	22444.5
12183	12573.0	12573.0	16183	16779.5	16897.5	22183	22375.5	22445.0
12184	12573.5	12573.5	16184	16780.0	16898.0			
12185	12574.0	12574.0	16185	16780.5	16898.5			
12186	12574.5	12574.5	16186	16781.0	16899.0			
12187	12575.0	12575.0	16187	16781.5	16899.5			
12188	12575.5	12575.5	16188	16782.0	16900.0			
12189	12576.0	12576.0	16189	16782.5	16900.5			
12190	12576.5	12576.5	16190	16783.0	16901.0			
12191	12577.0	12577.0	16191	16783.5	16901.5			
12192	12577.5	12657.0	16192	16784.0	16902.0			
12193	12578.0	12657.5	16193	16784.5	16902.5			
12194	12578.5	12658.0	16194	16785.0	16785.0			
			16195	16785.5	16785.5			
			16196	16786.0	16786.0			
			16197	16786.5	16786.5			
			16198	16787.0	16787.0			
			16199	16787.5	16787.5			
			16200	16788.0	16788.0			
			16201	16788.5	16788.5			
			16202	16789.0	16789.0			
			16203	16789.5	16789.5			
			16204	16790.0	16790.0			
			16205	16790.5	16790.5			
			16206	16791.0	16791.0			
			16207	16791.5	16791.5			
			16208	16792.0	16792.0			
			16209	16792.5	16792.5			
			16210	16793.0	16793.0			
			16211	16793.5	16793.5			
			16212	16794.0	16794.0			
			16213	16794.5	16794.5			
			16214	16795.0	16795.0			
			16215	16795.5	16795.5			
			16216	16796.0	16796.0			
			16217	16796.5	16796.5			
			16218	16797.0	16797.0			
			16219	16797.5	16797.5			
			16220	16798.0	16798.0			
			16221	16798.5	16798.5			
			16222	16799.0	16799.0			
			16223	16799.5	16799.5			
			16224	16800.0	16800.0			
			16225	16800.5	16800.5			
			16226	16801.0	16801.0			
			16227	16801.5	16801.5			
			16228	16802.0	16802.0			
			16229	16802.5	16802.5			
			16230	16803.0	16803.0			
			16231	16803.5	16803.5			
			16232	16804.0	16804.0			
			16233	16804.5	16804.5			
			16234	16805.0	16903.0			
			16235	16805.5	16903.5			
			16236	16806.0	16904.0			

FURUNO ITU CW FREQUENCY TABLE (effective from July 1, 1991, 1991年7月1日より発効)

No.	4 MHz	No.	6 MHz	No.	8 MHz	No.	12 MHz	No.	16 MHz	No.	22 MHz	No.	25/26 MHz
4001	4187.0	6001	6285.0	8001	8342.0	12001	12422.0	16001	16619.0	22001	22242.0	25001	25161.5
4002	4187.5	6002	6285.5	8002	8342.5	12002	12422.5	16002	16619.5	22002	22242.5	25002	25162.0
4003	4188.0	6003	6286.0	8003	8343.0	12003	12423.0	16003	16620.0	22003	22243.0	25003	25162.5
4004	4188.5	6004	6286.5	8004	8343.5	12004	12423.5	16004	16620.5	22004	22243.5	25004	25163.0
4005	4189.0	6005	6287.0	8005	8344.0	12005	12424.0	16005	16621.0	22005	22244.0	25005	25163.5
4006	4189.5	6006	6287.5	8006	8344.5	12006	12424.5	16006	16621.5	22006	22244.5	25006	25164.0
4007	4190.0	6007	6288.0	8007	8345.0	12007	12425.0	16007	16622.0	22007	22245.0	25007	25164.5
4008	4190.5	6008	6288.5	8008	8345.5	12008	12425.5	16008	16622.5	22008	22245.5	25008	25165.0
4009	4191.0	6009	6289.0	8009	8346.0	12009	12426.0	16009	16623.0	22009	22246.0	25009	25165.5
4010	4191.5	6010	6289.5	8010	8346.5	12010	12426.5	16010	16623.5	22010	22246.5	25010	25166.0
4011	4192.0	6011	6290.0	8011	8347.0	12011	12427.0	16011	16624.0	22011	22247.0	25011	25166.5
4012	4192.5	6012	6290.5	8012	8347.5	12012	12427.5	16012	16624.5	22012	22247.5	25012	25167.0
4013	4193.0	6013	6291.0	8013	8348.0	12013	12428.0	16013	16625.0	22013	22248.0	25013	25167.5
4014	4193.5	6014	6291.5	8014	8348.5	12014	12428.5	16014	16625.5	22014	22248.5	25014	25168.0
4015	4194.0	6015	6292.0	8015	8349.0	12015	12429.0	16015	16626.0	22015	22249.0	25015	25168.5
4016	4194.5	6016	6292.5	8016	8349.5	12016	12429.5	16016	16626.5	22016	22249.5	25016	25169.0
4017	4195.0	6017	6293.0	8017	8350.0	12017	12430.0	16017	16627.0	22017	22250.0	25017	25169.5
4018	4195.5	6018	6293.5	8018	8350.5	12018	12430.5	16018	16627.5	22018	22250.5	25018	25170.0
4019	4196.0	6019	6294.0	8019	8351.0	12019	12431.0	16019	16628.0	22019	22251.0	25019	25170.5
4020	4196.5	6020	6294.5	8020	8351.5	12020	12431.5	16020	16628.5	22020	22251.5	25020	25171.0
4021	4197.0	6021	6295.0	8021	8352.0	12021	12432.0	16021	16629.0	22021	22252.0	*25021	25171.5
4022	4197.5	6022	6295.5	8022	8352.5	12022	12432.5	16022	16629.5	22022	22252.5	*25022	25172.0
4023	4198.0	6023	6296.0	8023	8353.0	12023	12433.0	16023	16630.0	22023	22253.0	*25023	25172.5
4024	4198.5	6024	6296.5	8024	8353.5	12024	12433.5	16024	16630.5	22024	22253.5		
4025	4199.0	6025	6297.0	8025	8354.0	12025	12434.0	16025	16631.0	22025	22254.0		
4026	4199.5	6026	6297.5	8026	8354.5	12026	12434.5	16026	16631.5	22026	22254.5		
4027	4200.0	6027	6298.0	8027	8355.0	12027	12435.0	16027	16632.0	22027	22255.0		
4028	4200.5	6028	6298.5	8028	8355.5	12028	12435.5	16028	16632.5	22028	22255.5		
4029	4201.0	6029	6299.0	8029	8356.0	12029	12436.0	16029	16633.0	22029	22256.0		
4030	4201.5	6030	6299.5	8030	8356.5	12030	12436.5	16030	16633.5	22030	22256.5		
4031	4202.0	6031	6300.0	8031	8357.0	12031	12437.0	16031	16634.0	22031	22257.0		
*4032	4182.0	*6032	6276.0	8032	8357.5	12032	12437.5	16032	16634.5	22032	22257.5		
*4033	4182.5	*6033	6276.5	8033	8358.0	12033	12438.0	16033	16635.0	22033	22258.0		
*4034	4183.0	*6034	6277.0	8034	8358.5	12034	12438.5	16034	16635.5	22034	22258.5		
*4035	4183.5	*6035	6277.5	8035	8359.0	12035	12439.0	16035	16636.0	22035	22259.0		
*4036	4184.0	*6036	6278.0	8036	8359.5	12036	12439.5	16036	16636.5	22036	22259.5		
*4037	4184.5	*6037	6278.5	8037	8360.0	12037	12440.0	16037	16637.0	22037	22260.0		
*4038	4185.0	*6038	6279.0	8038	8360.5	12038	12440.5	16038	16637.5	22038	22260.5		
*4039	4185.5	*6039	6279.5	8039	8361.0	12039	12441.0	16039	16638.0	22039	22261.0		
*4040	4186.0	*6040	6280.0	8040	8361.5	12040	12441.5	16040	16638.5	22040	22261.5		
*4041	4186.5	*6041	6280.5	8041	8362.0	12041	12442.0	16041	16639.0	22041	22262.0		
				8042	8362.5	12042	12442.5	16042	16639.5	22042	22262.5		
				8043	8363.0	12043	12443.0	16043	16640.0	22043	22263.0		
				8044	8363.5	12044	12443.5	16044	16640.5	22044	22263.5		
				8045	8364.0	12045	12444.0	16045	16641.0	22045	22264.0		
				8046	8364.5	12046	12444.5	16046	16641.5	22046	22264.5		
				8047	8365.0	12047	12445.0	16047	16642.0	22047	22265.0		
				8048	8365.5	12048	12445.5	16048	16642.5	22048	22265.5		
				8049	8371.0	12049	12446.0	16049	16643.0	22049	22266.0		
				8050	8371.5	12050	12446.5	16050	16643.5	22050	22266.5		
				8051	8372.0	12051	12447.0	16051	16644.0	22051	22267.0		
				8052	8372.5	12052	12447.5	16052	16644.5	22052	22267.5		
				8053	8373.0	12053	12448.0	16053	16645.0	22053	22268.0		
				8054	8373.5	12054	12448.5	16054	16645.5	22054	22268.5		
				8055	8374.0	12055	12449.0	16055	16646.0	22055	22269.0		
				8056	8374.5	12056	12449.5	16056	16646.5	22056	22269.5		
				8057	8375.0	12057	12450.0	16057	16647.0	22057	22270.0		
				8058	8375.5	12058	12450.5	16058	16647.5	22058	22270.5		
				8059	8376.0	12059	12451.0	16059	16648.0	22059	22271.0		
				*8060	8366.0	12060	12451.5	16060	16648.5	22060	22271.5		

*: Calling Frequency

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				*8061	8366.5	12061	12452.0	16061	16649.0	22061	22272.0		
				*8062	8367.0	12062	12452.5	16062	16649.5	22062	22272.5		
				*8063	8367.5	12063	12453.0	16063	16650.0	22063	22273.0		
				*8064	8368.0	12064	12453.5	16064	16650.5	22064	22273.5		
				*8065	8368.5	12065	12454.0	16065	16651.0	22065	22274.0		
				*8066	8369.0	12066	12454.5	16066	16651.5	22066	22274.5		
				*8067	8369.5	12067	12455.0	16067	16652.0	22067	22275.0		
				*8068	8370.0	12068	12455.5	16068	16652.5	22068	22275.5		
				*8069	8370.5	12069	12456.0	16069	16653.0	22069	22276.0		
						12070	12456.5	16070	16653.5	22070	22276.5		
						12071	12457.0	16071	16654.0	22071	22277.0		
						12072	12457.5	16072	16654.5	22072	22277.5		
						12073	12458.0	16073	16655.0	22073	22278.0		
						12074	12458.5	16074	16655.5	22074	22278.5		
						12075	12459.0	16075	16656.0	22075	22279.0		
						12076	12459.5	16076	16656.5	*22076	22279.5		
						12077	12460.0	16077	16657.0	*22077	22280.0		
						12078	12460.5	16078	16657.5	*22078	22280.5		
						12079	12461.0	16079	16658.0	*22079	22281.0		
						12080	12461.5	16080	16658.5	*22080	22281.5		
						12081	12462.0	16081	16659.0	*22081	22282.0		
						12082	12462.5	16082	16659.5	*22082	22282.5		
						12083	12463.0	16083	16660.0	*22083	22283.0		
						12084	12463.5	16084	16660.5	*22084	22283.5		
						12085	12464.0	16085	16661.0	*22085	22284.0		
						12086	12464.5	16086	16661.5				
						12087	12465.0	16087	16662.0				
						12088	12465.5	16088	16662.5				
						12089	12466.0	16089	16663.0				
						12090	12466.5	16090	16663.5				
						12091	12467.0	16091	16664.0				
						12092	12467.5	16092	16664.5				
						12093	12468.0	16093	16665.0				
						12094	12468.5	16094	16665.5				
						12095	12469.0	16095	16666.0				
						12096	12469.5	16096	16666.5				
						12097	12470.0	16097	16667.0				
						12098	12470.5	16098	16667.5				
						12099	12471.0	16099	16668.0				
						12100	12471.5	16100	16668.5				
						12101	12472.0	16101	16669.0				
						12102	12472.5	16102	16669.5				
						12103	12473.0	16103	16670.0				
						12104	12473.5	16104	16670.5				
						12105	12474.0	16105	16671.0				
						12106	12474.5	16106	16671.5				
						12107	12475.0	16107	16672.0				
						12108	12475.5	16108	16672.5				
						12109	12476.0	16109	16673.0				
						12110	12476.5	16110	16673.5				
						*12111	12550.0	16111	16674.0				
						*12112	12550.5	16112	16674.5				
						*12113	12551.0	16113	16675.0				
						*12114	12551.5	16114	16675.5				
						*12115	12552.0	16115	16676.0				
						*12116	12552.5	16116	16676.5				
						*12117	12553.0	16117	16677.0				
						*12118	12553.5	16118	16677.5				
						*12119	12554.0	16119	16678.0				
						*12120	12554.5	16120	16678.5				

*: Calling Frequency

— continued —

16121	16679.0
16122	16679.5
16123	16680.0
16124	16680.5
16125	16681.0
16126	16681.5
16127	16682.0
16128	16682.5
16129	16683.0
*16130	16734.0
*16131	16734.5
*16132	16735.0
*16133	16735.5
*16134	16736.0
*16135	16736.5
*16136	16737.0
*16137	16737.5
*16138	16738.0
*16139	16738.5

*: Calling Frequency

FURUNO

USA SSB FREQUENCY TABLE FOR FURUNO SSB RADIOTELEPHONES

SSBUSA

4 MHz BAND			6 MHz BAND			8 MHz BAND			12 MHz BAND			16 MHz BAND			18/19 MHz BAND			22 MHz BAND			25/26 MHz BAND			Remarks
No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	No.	TX	RX	
300	3023	3023	600	6215	6215	800	8291	8291	1200	12290	12290	1600	16420	16420										Distress Channels
400	4125	4125																						
500	5680	5680																						
401	4065	4357	601	6200	6501	801	8195	8719	1201	12230	13077	1601	16360	17242	1801	18780	19755	2201	22000	22696	2501	25070	26145	ITU SSB Duplex Channels
402	4068	4360	602	6203	6504	802	8198	8722	1202	12233	13080	1602	16363	17245	1802	18783	19758	2202	22003	22699	2502	25073	26148	
403	4071	4363	603	6206	6507	803	8201	8725	1203	12236	13083	1603	16366	17248	1803	18786	19761	2203	22006	22702	2503	25076	26151	
404	4074	4366	604	6209	6510	804	8204	8728	1204	12239	13086	1604	16369	17251	1804	18789	19764	2204	22009	22705	2504	25079	26154	
405	4077	4369	605	6212	6513	805	8207	8731	1205	12242	13089	1605	16372	17254	1805	18792	19767	2205	22012	22708	2505	25082	26157	
406	4080	4372	606	6215	6516	806	8210	8734	1206	12245	13092	1606	16375	17257	1806	18795	19770	2206	22015	22711	2506	25085	26160	
407	4083	4375	607	6218	6519	807	8213	8737	1207	12248	13095	1607	16378	17260	1807	18798	19773	2207	22018	22714	2507	25088	26163	
408	4086	4378	608	6221	6522	808	8216	8740	1208	12251	13098	1608	16381	17263	1808	18801	19776	2208	22021	22717	2508	25091	26166	
409	4089	4381				809	8219	8743	1209	12254	13101	1609	16384	17266	1809	18804	19779	2209	22024	22720	2509	25094	26169	
410	4092	4384				810	8222	8746	1210	12257	13104	1610	16387	17269	1810	18807	19782	2210	22027	22723	2510	25097	26172	
411	4095	4387				811	8225	8749	1211	12260	13107	1611	16390	17272	1811	18810	19785	2211	22030	22726				
412	4098	4390				812	8228	8752	1212	12263	13110	1612	16393	17275	1812	18813	19788	2212	22033	22729				
413	4101	4393				813	8231	8755	1213	12266	13113	1613	16396	17278	1813	18816	19791	2213	22036	22732				
414	4104	4396				814	8234	8758	1214	12269	13116	1614	16399	17281	1814	18819	19794	2214	22039	22735				
415	4107	4399				815	8237	8761	1215	12272	13119	1615	16402	17284	1815	18822	19797	2215	22042	22738				
416	4110	4402				816	8240	8764	1216	12275	13122	1616	16405	17287				2216	22045	22741				
417	4113	4405				817	8243	8767	1217	12278	13125	1617	16408	17290				2217	22048	22744				
418	4116	4408				818	8246	8770	1218	12281	13128	1618	16411	17293				2218	22051	22747				
419	4119	4411				819	8249	8773	1219	12284	13131	1619	16414	17296				2219	22054	22750				
420	4122	4414				820	8252	8776	1220	12287	13134	1620	16417	17299				2220	22057	22753				
421	4125	4417				821	8255	8779	1221	12290	13137	1621	16420	17302				2221	22060	22756				
422	4128	4420				822	8258	8782	1222	12293	13140	1622	16423	17305				2222	22063	22759				
423	4131	4423				823	8261	8785	1223	12296	13143	1623	16426	17308				2223	22066	22762				
424	4134	4426				824	8264	8788	1224	12299	13146	1624	16429	17311				2224	22069	22765				
425	4137	4429				825	8267	8791	1225	12302	13149	1625	16432	17314				2225	22072	22768				
426	4140	4432				826	8270	8794	1226	12305	13152	1626	16435	17317				2226	22075	22771				
427	4143	4435				827	8273	8797	1227	12308	13155	1627	16438	17320				2227	22078	22774				
428	4060	4351				828	8276	8800	1228	12311	13158	1628	16441	17323				2228	22081	22777				
						829	8279	8803	1229	12314	13161	1629	16444	17326				2229	22084	22780				
						830	8282	8806	1230	12317	13164	1630	16447	17329				2230	22087	22783				
						831	8285	8809	1231	12320	13167	1631	16450	17332				2231	22090	22786				
						832	8288	8812	1232	12323	13170	1632	16453	17335				2232	22093	22789				
									1233	12326	13173	1633	16456	17338				2233	22096	22792				
									1234	12329	13176	1634	16459	17341				2234	22099	22795				
									1235	12332	13179	1635	16462	17344				2235	22102	22798				
						836	8113	8713	1236	12335	13182	1636	16465	17347				2236	22105	22801				
						837	8128	8716	1237	12338	13185	1637	16468	17350				2237	22108	22804				
												1638	16471	17353				2238	22111	22807				
												1639	16474	17356				2239	22114	22810				
												1640	16477	17359				2240	22117	22813				
												1641	16480	17362				2241	22120	22816				
												1642	16483	17365				2242	22123	22819				
												1643	16486	17368				2243	22126	22822				
												1644	16489	17371				2244	22129	22825				
												1645	16492	17374				2245	22132	22828				
												1646	16495	17377				2246	22135	22831				
												1647	16498	17380				2247	22138	22834				
												1648	16501	17383										
												1649	16504	17386										
461	4146	4146	661	6224	6224	861	8294	8294	1261	12353	12353	1661	16528	16528	1861	18840	18840	2261	22159	22159	2561	25115	25115	Simplex Channels
462	4149	4149	662	6227	6227	862	8297	8297	1262	12356	12356	1662	16531	16531	1862	18843	18843	2262	22162	22162	2562	25118	25118	
463	4417	4417	663	6230	6230				1263	12359	12359	1663	16534	16534				2263	22165	22165				
			664	6516	6516													2264	22168	22168				
																		2265	22171	22171				
471	4065	4065	671	6209	6209	871	8201	8201	1271	12362	12362	1671	16543	16543										Mississippi River Channels
472	4089	4089	672	6212	6212	872	8213	8213	1272	12365	12365	1672	16546	16546										
473	4116	4116	673	6510	6510	873	8725	8725																
474	4408	4408	674	6513	6513	874	8737	8737																
481	4366	4366																						Alaska Radio Channels
482	4369	4369																						
483	4396	4396																						
484	4402	4402																						
485	4420	4420																						
486	4423	4423																						

FURUNO ELECTRIC CO., LTD.

MF BAND ITU TELEX FREQUENCY TABLE

Channel No.	Coast station (NBDP) (DSC) (kHz)	Ship station (NBDP) (DSC) (kHz)
201	1607	2142
202	1607.5	2142.5
203	1608	2143
204	1608.5	2143.5
205	1609	2144
206	1609.5	2144.5
207	1610	2145
208	1610.5	2145.5
209	1611	2146
210	1611.5	2146.5
211	1612	2147
212	1612.5	2147.5
213	1613	2148
214	1613.5	2148.5
215	1614	2149
216	1614.5	2149.5
217	1615	2150
218	1615.5	2150.5
219	1616	2151
220	1616.5	2151.5
221	1617	2152
222	1617.5	2152.5
223	1618	2153
224	1618.5	2153.5
225	1619	2154
226	1619.5	2154.5
227	1620	2155
228	1620.5	2155.5
229	1621	2156
230	1621.5	2156.5
231	1622	2157
232	1622.5	2157.5
233	1623	2158
234	1623.5	2158.5
235	1624	2159
236	1624.5	2159.5

MF BAND ITU SSB FREQUENCY TABLE

Channel No.	Coast station assigned frequency (kHz)	Ship station assigned frequency (kHz)	Channel No.	Coast station assigned frequency (kHz)	Ship station assigned frequency (kHz)
241	1636.4 (1635)	2061.4 (2060)	271	1726.4 (1725)	2070.4 (2069)
242	1639.4 (1638)	2064.4 (2063)	272	1729.4 (1728)	2073.4 (2072)
243	1642.4 (1641)	2067.4 (2066)	273	1732.4 (1731)	2076.4 (2075)
244	1645.4 (1644)	2070.4 (2069)	274	1735.4 (1734)	2079.4 (2078)
245	1648.4 (1647)	2073.4 (2072)	275	1738.4 (1737)	2082.4 (2081)
246	1651.4 (1650)	2076.4 (2075)	276	1741.4 (1740)	2085.4 (2084)
247	1654.4 (1653)	2079.4 (2078)	277	1744.4 (1743)	2088.4 (2087)
248	1657.4 (1656)	2082.4 (2081)	278	1747.4 (1746)	2091.4 (2090)
249	1660.4 (1659)	2085.4 (2084)	279	1750.4 (1749)	2094.4 (2093)
250	1663.4 (1662)	2088.4 (2087)	280	1753.4 (1752)	2097.4 (2096)
251	1666.4 (1665)	2091.4 (2090)	281	1756.4 (1755)	2100.4 (2099)
252	1669.4 (1668)	2094.4 (2093)	282	1759.4 (1758)	2103.4 (2102)
253	1672.4 (1671)	2097.4 (2096)	283	1762.4 (1761)	2106.4 (2105)
254	1675.4 (1674)	2100.4 (2099)	284	1765.4 (1764)	2109.4 (2108)
255	1678.4 (1677)	2103.4 (2102)	285	1768.4 (1767)	2112.4 (2111)
256	1681.4 (1680)	2106.4 (2105)	286	1771.4 (1770)	2115.4 (2114)
257	1684.4 (1683)	2109.4 (2108)	287	1774.4 (1773)	2118.4 (2117)
258	1687.4 (1686)	2112.4 (2111)	288	1777.4 (1776)	2121.4 (2120)
259	1690.4 (1689)	2115.4 (2114)	289	1780.4 (1779)	2124.4 (2123)
260	1693.4 (1692)	2118.4 (2117)	290	1783.4 (1782)	2127.4 (2126)
261	1696.4 (1695)	2121.4 (2120)	291	1786.4 (1785)	2130.4 (2129)
262	1699.4 (1698)	2124.4 (2123)	292	1789.4 (1788)	2133.4 (2132)
263	1702.4 (1701)	2127.4 (2126)	293	1792.4 (1791)	2136.4 (2135)
264	1705.4 (1704)	2130.4 (2129)	294	1795.4 (1794)	2139.4 (2138)
265	1708.4 (1707)	2133.4 (2132)	295	1798.4 (1797)	2061.4 (2060)
266	1711.4 (1710)	2136.4 (2135)			
267	1714.4 (1713)	2139.4 (2138)			
268	1717.4 (1716)	2061.4 (2060)			
269	1720.4 (1719)	2064.4 (2063)			
270	1723.4 (1722)	2067.4 (2066)			

(   ): CARRIER FREQUENCY

Appendix 2

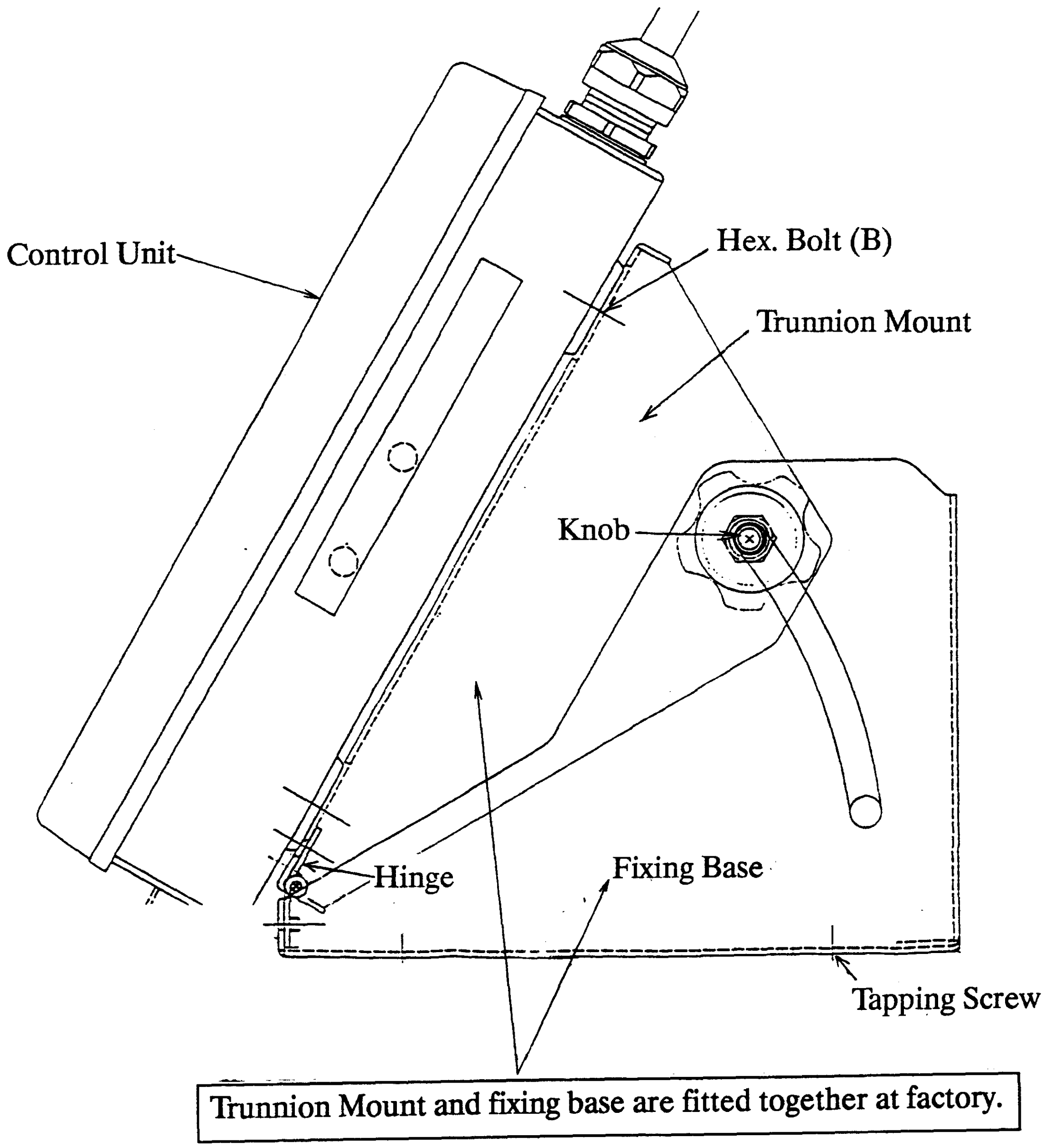
Optional Supply for Mounting Plate Assy of Control Unit. (angle adjustable)

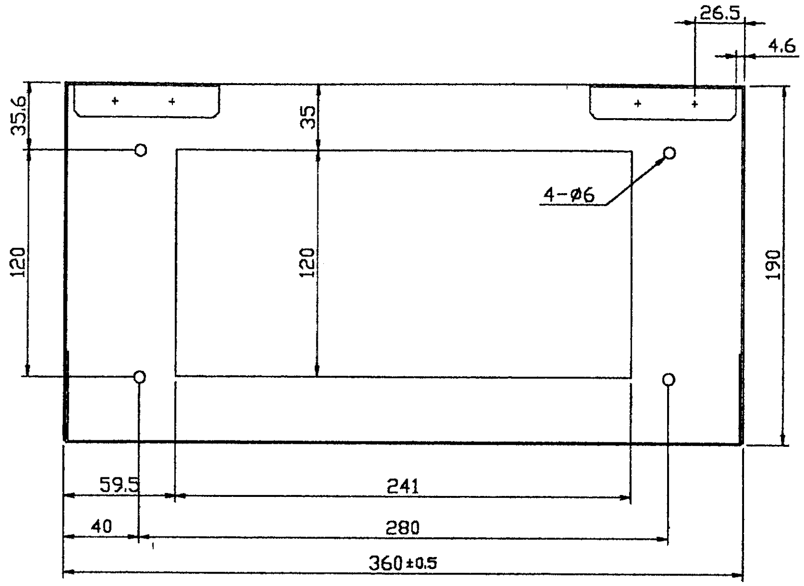
A mounting plate assembly for the control unit, consisting of an inclination plate and a fixing base, is available for adjustment of LCD viewing angle. See next page.

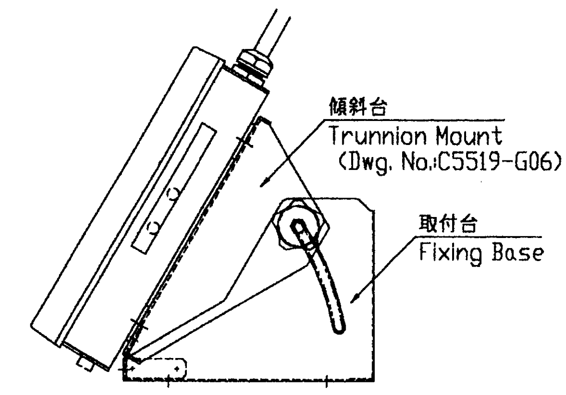
Type	Code No.
OP05-37	005-931-760

[Contents of Mounting Plate Assy.]

1. Trunnion Mount 2. Fixing Base 3. Hinge	Fitted together at factory.
4. Knob (2 pcs.) 5. Packing (2 pcs.) 6. Rubber Washer (2 pcs.)	To change fixing angle
7. Tapping Screw (4 pcs.) 8. Flat Washer (4 pcs.)	To mount fixing base to the table
9. Hex. Bolt (B) (4 pcs.)	To mount control unit to trunnion mount

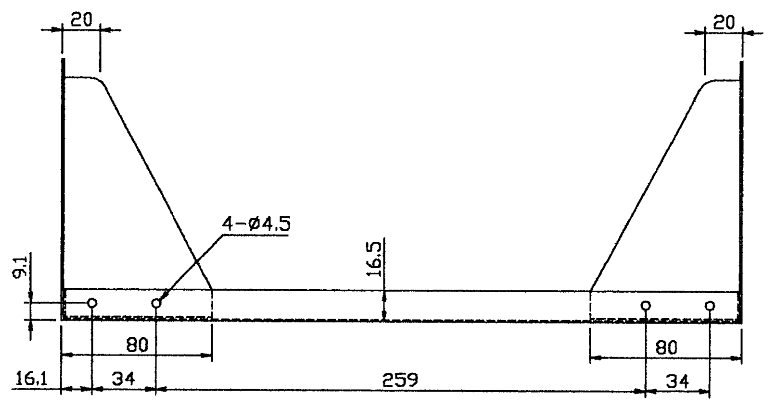

Control Unit
Hex. Bolt (B)
Trunnion Mount
Knob
Hinge
Fixing Base
Tapping Screw
Trunnion Mount and fixing base are fitted together at factory.

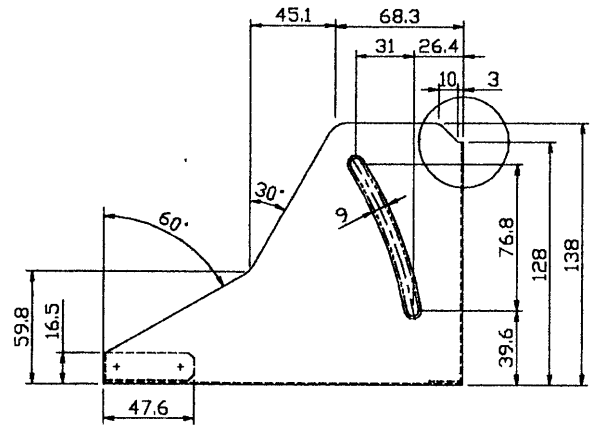




取付完成図
COMPLETE ASSEMBLY

TYPE:OP05-37
CODE No.:005-931-760



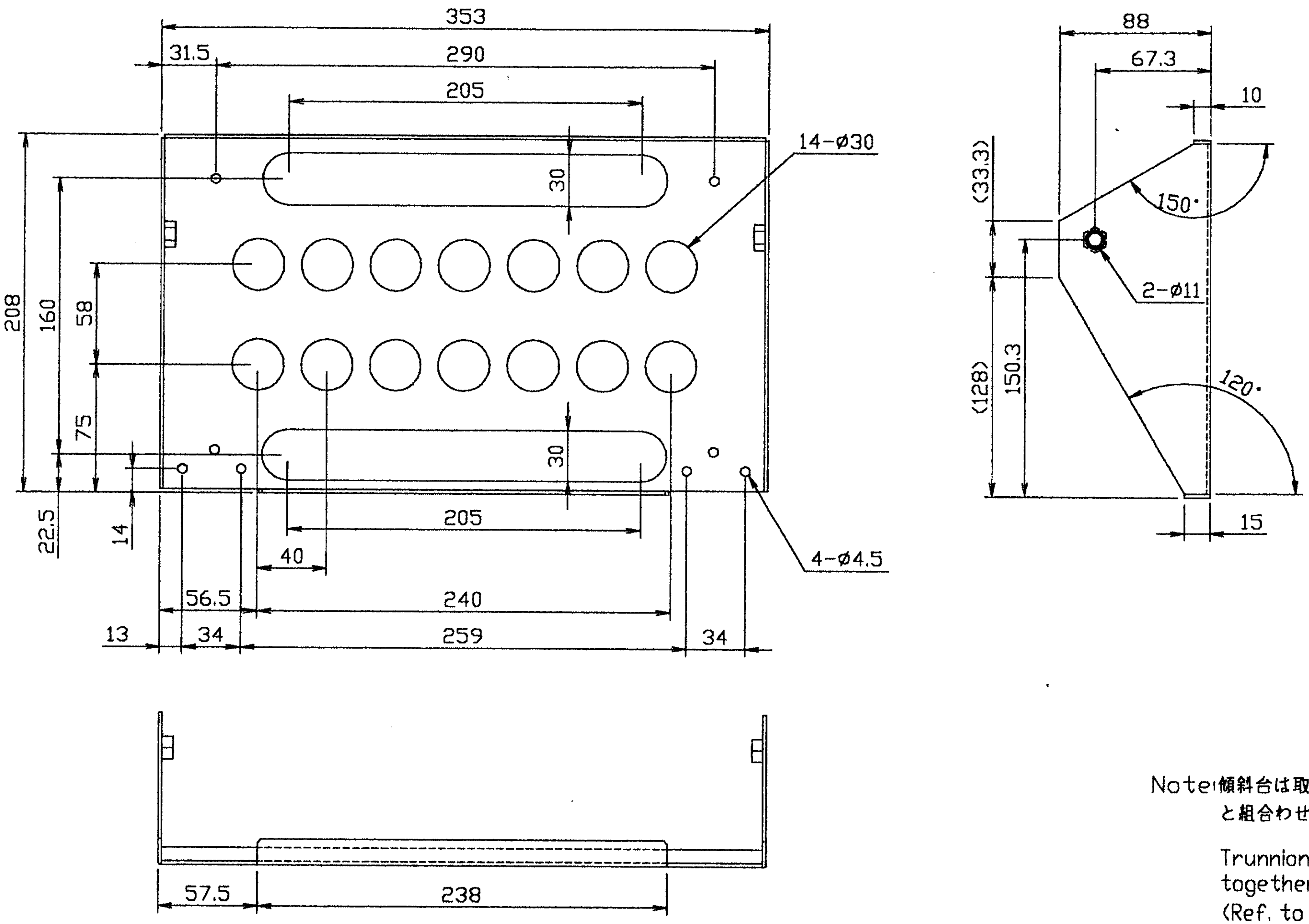


FS-1600
2500
5000
8000

DRAWN Jun. 27 '01	T. YAMASAKI	TITLE	
CHECKED Jun. 27 '01	Y. KIMURA	名称	取付台外観図
APPROVED Jun. 27 '01	Y. KIMURA		外寸図
SCALE 1/4	MASS ±10% kg	NAME	FIXING BASE
DWG.No.	C5519-G05-B		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

FURUNO



Note: 傾斜台は取付台（図番：C5519-G05）と組合わせて使用します。

Trunnion mount should be used together with the fixing base. (Ref. to Dwg. No. C5519-G05.)

FS-1600
2500
5000
8000

DRAWN Jun. 27 '01	T. YAMASAKI	TITLE	
CHECKED Jun. 27 '01	Y. KIMURA	名称	傾斜台外観図
APPROVED Jun. 27 '01	Y. KIMURA		外寸図
SCALE 1/4	MASS ±10% kg	NAME	TRUNNION MOUNT
DWG.No.	C5519-G06-B		OUTLINE DRAWING

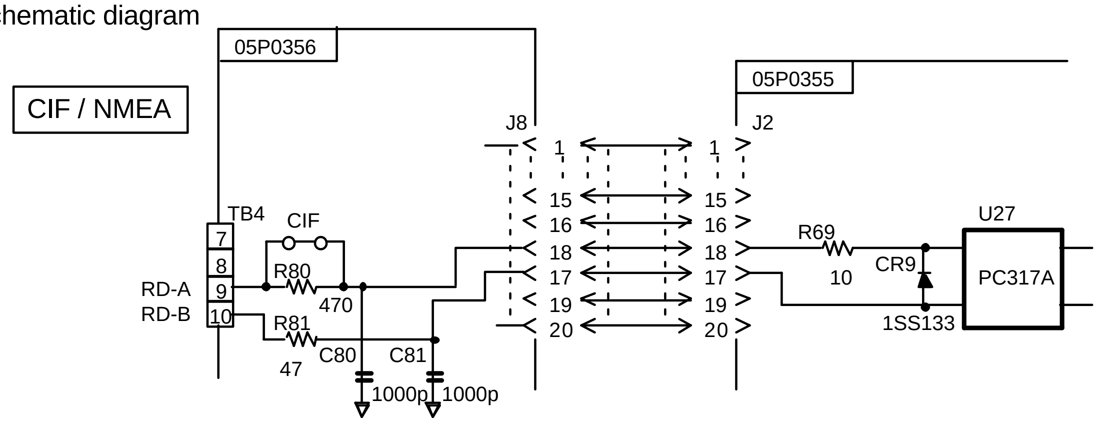
FURUNO ELECTRIC CO., LTD.

Digital Interface (IEC 61162-1 Edition 2)

Input sentences

GGA, GLL, RMA, ZDA, RMC

Schematic diagram



Load requirements as listner

Isolation	Optocoupler
Input impedance	480 ohms
Max. Voltage	± 15V
Threshold	4 mA

GGA - Global positioning system (GPS) fix data

```
$--GGA,hhmmss.ss,llll.lll,a,yyyyy.yyy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>
       |         |        | |         | | |  |   |   | |   | |   |    |
       |         |        | |         | | |  |   |   | |   | |   |    +-- 11
       |         |        | |         | | |  |   |   | |   | |   +---- 10
       |         |        | |         | | |  |   |   | |   | +--------- 9
       |         |        | |         | | |  |   |   | +---+------------ 8
       |         |        | |         | | |  +---+------------------ 7
       |         |        | |         | | +------------------------- 6
       |         |        | |         | +---------------------------- 5
       |         |        | |         +------------------------------ 4
       |         |        | +---------+---------------------------- 3
       |         +--------+--------------------------------------- 2
       +------------------------------------------------------------ 1
```

1. UTC of position
2. Latitude, N/S
3. Longitude, E/W
4. GPS quality indicator (see note)
5. Number of satllite in use,00-12, may be different from the number in view
6. Horizontal dilution of precision
7. Antenna altitude above/below mean sealevel, m
8. Geoidal separation, m
9. Age of differential GPS data
10. Differential reference station ID, 0000-1023
11. Checksum

NOTE
0 = fix not available or invalid
1 = GPS SPS mode, fix valid
2 = differential GPS, SPS mode, fix valid
3 = GPS PPS mode, fix valid
4 = Real Time Kinetic. Satellite system used in RTK mode with fixed integers
5 = Float RTK. Satellite system used in RTK mode with floating fingers
6 = Estimated (dead reckoning) mode
7 = Manual input mode
8 = Simulator mode
The GPS quality indicator shall not be a null field.

GLL - Geographic position - latitude and longitude

```
$--GLL,llll.ll,a,yyyyy.yyy,a,hhmmss.ss,A,a*hh<CR><LF>
       |    |     |    |         |    | | |
       |    |     |    |         |    | | +------- 6
       |    |     |    |         |    | +--------- 5
       |    |     |    |         |    +----------- 4
       |    |     |    |         +---------------- 3
       |    |     +----+---------------------- 2
       +----+---------------------------------- 1
```

1. Latitude, N/S
2. Longitude, E/W
3. UTC of position
4. Status: A=data valid, V=data invalid
5. Mode indicator(see note)
6. Checksum

NOTE Positioning system Mode indicator:

A = Autonomous
D = Differential
E = Estimated (dead reckoning)
M = Manual input
S = Simulator
N = Data not valid

The Mode indicator field supplements the Status field. The Status field shall be set to V=invalid for all values of Operating Mode except for A=Autonomous and D=Differential. The positioning system Mode indicator and Status field shall not be null fields.

RMA - Recommended minimum navigation information - Loran C data

```
$--RMA,A,llll.lll,a,yyyyy.yy,a,x.x,x.x,x.x,x.x,x.x,a,a*hh<CR><LF>
       | |        | |        | |   |   |   |   |   | | |
       | |        | |        | |   |   |   |   |   | | +------- 10
       | |        | |        | |   |   |   |   |   | +--------- 9
       | |        | |        | |   |   |   |   +---+----------- 8
       | |        | |        | |   |   |   +------------------ 7
       | |        | |        | |   |   +---------------------- 6
       | |        | |        | |   +-------------------------- 5
       | |        | |        | +------------------------------ 4
       | |        | +--------+-------------------------------- 3
       | +--------+---------------------------------------- 2
       +--------------------------------------------------------- 1
```

1. Status: A=data valid, V=blink, cycle or SNR warning
2. Latitude, degrees N/S
3. Longitude, degrees E/W
4. Time difference A, microseconds
5. Time difference B, microseconds
6. Speed over ground, knots
7. Course over ground, degrees true
8. Magnetic variation(see note 1),degree E/W
9. Mode indicator(see note 2)
10. Checksum

NOTE 1 - Easterly variation(E) subtracts from true course
Westerly variation(W) adds to true course

NOTE 2 Positioning system Mode indicator:
- A = Autonomous
- D = Differential
- E = Estimated (dead reckoning)
- M = Manual input
- S = Simulator
- N = Data not valid

The Mode indicator field supplements the Status field. The Status field shall be set to V=invalid for all values of Operating Mode except for A=Autonomous and D=Differential. The positioning system Mode indicator and Status field shall not be null fields.

RMC - Recommended minimum specific GPS/TRANSIT data

```
$--RMC,hhmmss.ss,A,llll.ll,a,yyyyy.yyy,a,x.x,x.x,xxxxxx,x.x,a,a*hh<CR><LF>
       |         | |    |  |      |  |   |   |      |   | | |
       |         | |    |  |      |  |   |   |      |   | | +--- 10
       |         | |    |  |      |  |   |   |      |   | +----- 9
       |         | |    |  |      |  |   |   |      +---+------- 8
       |         | |    |  |      |  |   |   +-------------- 7
       |         | |    |  |      |  |   +-------------------- 6
       |         | |    |  |      |  +------------------------ 5
       |         | |    |  +------+--------------------------- 4
       |         | +----+--------------------------------------- 3
       |         +------------------------------------------------- 2
       +--------------------------------------------------------- 1
```

1. UTC of position fix
2. Status: A=data valid, V=navigation receiver warning
3. Latitude, N/S
4. Longitude, E/W
5. Speed over ground, knots
6. Course over ground, degrees true
7. Date: dd/mm/yy
8. magnetic variation, degrees E/W
9. Mode indicator(see note)
10. Checksum

NOTE Positioning system Mode indicator:

A = Autonomous
D = Differential
E = Estimated (dead reckoning)
M = Manual input
S = Simulator
N = Data not valid

The Mode indicator field supplements the Status field. The Status field shall be set to V=invalid for all values of Operating Mode except for A=Autonomous and D=Differential. The positioning system Mode indicator and Status field shall not be null fields.

ZDA - Data and time

```
$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh<CR><LF>
       |         |  |   |   |  |  |
       |         |  |   |   |  |  +--------- 7
       |         |  |   |   |  +----------- 6
       |         |  |   |   +-------------- 5
       |         |  |   +------------------ 4
       |         |  +---------------------- 3
       |         +------------------------- 2
       +-------------------------------- 1
```

1. UTC
2. Day, 01 to 31(UTC)
3. Month, 01 to 12(UTC)
4. Year(UTC)
5. Local zone hours, 00h to +-13h
6. Local zone minutes, 00 to +59
   as local hours
7. Checksum

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Pub NO. DOC-470

Declaration of conformity 0560

We FURUNO ELECTRIC CO., LTD.

(Manufacturer)

9-52 Ashihara-Cho, Nishinomiya City, 662-8580, Hyogo, Japan

(Address)

hereby declare under our sole responsibility that the product

MF/HF SSB Radiotelephone model FS-5000 consisting of Transceiver unit FS-5000T, Control unit FS-5000C, Power supply unit PR-850 and Antenna tuning unit AT-5000

(Model names, type numbers)

to which this declaration relates conforms to the following standard(s) or normative document(s)

Standards	Test standards
IMO Resolution MSC.36(63)	
IMO Resolutions A.804(19), A.806(19)	ETS 300 373: 1997-08 Am 1, ETS 301 067: 1993-10 Am
IMO Resolution A.694(17)	EN 60945: 1997-01 (IEC 60945 Ed.03: 1996-11)
IMO MSC Circular MSC/Circ.862	
	IEC 61162-1: 2000-07

ITU-R Recommendations M.1173, M.476-5, M.491-1, M.492-6, M.493-9, M541-8, M.625-3

(title and/or number and date of issue of the standard(s) or other normative document(s))

For assessment, see

- EC type-examination certificate N°: 99212011/AA/01 of 14 May 2002 issued by Telefication, The Netherlands
- Test report KS0012 of 13 July 1990 issued by Kenley Radio Technology Laboratory
- Test report 916033 of 26 February 1992 issued by NKT
- Test report 953273 of 19 January 1996 issued by Telefication
- Test report 98507330 of 16 June 1999 issued by KTL

This declaration is issued according to the provisions of European Council Directive 96/98/EC on marine equipment modified by Commission Directive 2001/53/EC.

On behalf of Furuno Electric Co., Ltd.

Hiroaki Komatsu
Manager,
International Rules and Regulations

(name and signature or equivalent marking of authorized person)

Nishinomiya City, Japan
June 17, 2002

(Place and date of issue)